PROCEEDINGS

POTATO GROWER

TRADE SHOW AND SEMINAR
(Seed, Tablestock, Processing)

February 15-18, 1982

THEME: "GROWING POTATOES IN THE CHANGING ENVIRONMENT"

ORGANIZED BY: N.B. POTATO INDUSTRY IN CO-OPERATION WITH THE POTATO DIVISION, N.B. DEPARTMENT OF AGRICULTURE.

Foreword

The Annual Potato Growers Trade Show and Seminar was held February 15 - 18, 1982 at the Potato & Agricultural Resource Centre, Wicklow, and the Pres du Lac Motel, Grand Falls.

This year both the Potato Processing & Tablestock Growers Seminar and the Seed Potato Growers Seminar were combined into one industry-sponsored program. A total of 616 industry representatives registered for this year's seminar.

The success of this year's seminar can be attributed to the excellent presentations given by the program speakers and the trade show exhibitors for their continuing support and dedication towards the N.B. Potato industry.

On behalf of all organizations and individuals who assisted to make the 1982 N.B. Potato Growers Trade Show and Seminar an outstanding success may we extend to you our sincere thank-you. We are certain that with your continued support the quality of N.B. potatoes will always remain Number One on the world market place.

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OPENING REMARKS

Hon. Eugene Whelan
Minister of Agriculture
Ottawa

There's been a lot of talk recently about the future of Canada's agri-food sector. We in the federal government see a bright future for the sector. World population is expected to exceed six billion people by the turn of the century and that, in combination with rising per capita incomes in many developing nations, will result in a substantial increase in the demand for high quality foods.

Canada, unlike many other countries, has the potential to increase food production to meet part of this need. We believe food production can be increased by two-thirds from current levels and this is the goal we have set in our national Agri-food Strategy.

Your industry is an excellent example of what we are getting at in our strategy. Just last week I read an interesting article about the importance of potatoes in developing nations. It noted that the potato is the fastest growing crop in terms of land area in the developing world today.

Officials at the International Potato Center in Lima, Peru, also pointed out in the report that the potato is superior to cereals, pulses and cassava in terms of yield and food energy production.

However, the article did acknowledge that there are problems, the biggest one being storage. Another problem they didn't mention is that warm climate countries cannot produce high quality, disease-free seed stock. And this is where Canada, and New Brunswick and Prince Edward Island, in particular, fit in.

Both provinces are ideally located, both in terms of their geography and climate, for the production and exportation of high quality seed potatoes. And you already have an extensive transportation and storage system as well as production capability to build on.

The future growth and prosperity of your sector lies in the development of export markets. Already Canada is the second largest exporter of seed potatoes and 20 per cent of the seed grown in our nation is sold to other countries annually.

Despite the temporary loss of the Italian market for the 1980-81 marketing year, seed potato exporters still had a very good year with both strong demand for their product and strong prices. More than 155,000 tonnes of Canadian seed potatoes were exported. Of this total, P.E.I. exported more than 98,000 tonnes and New Brunswick, 51,000 tonnes. Canadian seed potatoes are being grown in the United States, Venezuela, Argentina, Uruguay, the Dominican Republic, Brazil, Portugal, Spain and Greece to name just a few of your markets. These countries buy Canadian seed potatoes because of the quality and the price.

But we all know that despite the vast potential for future growth, there remain some serious barriers that have to be overcome by your industry.

I think we have made significant progress under the Seed Potato Quality Improvement Program since it was first announced in July 1980. This program is designed to improve seed potato quality, improve management techniques, encourage further varietal development, expand market promotion and intensify disease control efforts.

Changes to the seed potato regulations have been introduced to assist in these efforts. The new regulations require zero tolerance for spindle tuber in all seed grades and provide for better post-harvest testing for bacterial ring rot.

We are now moving into the final, critical stage of our program.

Our goal has always been an agreement with the European Economic Community that our disease control standards are as good as theirs. The urgency of such recognition became apparent when the last agreement permitting our seed to be sold to Italy expired in March 1980.

I was very happy to see the Europeans reopen the Italian market last November. It was tough negotiating. But this doesn't reduce the importance of recognition of our regulations by the Community. This current agreement will expire December 31, 1982.

Such recognition is essential for long-term access and market development in the Italian and Greek markets as well as other European markets. But it is also important for future market development, especially in North America.

These nations grow potatoes for the early table market in the EEC and member states have indicated that they will accept only tablestock grown from seed potatoes that meet EEC phytosanitary regulations.

During the late 1970s, these markets accounted for nearly one-third of our seed potato exports. So you can see, there's a lot more at stake than just Italy and Greece. Our reputation on all world markets is on the line.

With the new agreement, we are basically on probation during which time we must prove ourselves and our programs. And you can bet your bottom dollar that the EEC and other nations will be keeping a close eye on our exports for any bacterial ring rot.

As part of the arrangement hammered out with the Europeans, Agriculture Canada is speeding up the expansion of its capacity for post-harvest laboratory testing, developing production criteria for our Elite seed farms that are in line with European practices, and working with Community phytosanitary experts on mutually agreed post-harvest testing procedures.

The EEC agreement also calls for the creation of bacterial ring rot free zones where the disease has not been identified for at least three years. Only seed potatoes from these zones will be accepted by the Europeans.

This agreement represents a major step towards our goals. The occurrence of bacterial ring rot in your province and P.E.I. is now very low because of the system of surveys and tests that have been introduced in recent years. I believe it is only a

matter of a few years before it is entirely eliminated from our seed potato producing areas.

I am a bit concerned, as I am sure you are, about the recent reports of bacterial ring rot in Quebec and some suggestions that it was in seed stock from New Brunswick. Since then, my Department has conducted an extensive investigation into the source of the bacterial ring rot and has established that it did not come from New Brunswick or P.E.I. seed stock. The province of Quebec does not have a provincial program to control this disease in table potato fields like New Brunswick and P.E.I. do and I have been urging Quebec to develop a similar program themselves to remove the threat of cross-contamination of seed production fields from table stock fields.

The intensified efforts in the area of inspection and testing do have a price tag attached, however. Last year, Canadian producers requested certification of about 38,000 hectares of seed potatoes of which 32,000 hectares were certified. The inspection and testing costs totalled some $3.5 million last year. With the new effort, this is bound to go up.

The federal government is committed to introducing fees for these services and we have received the support of the provincial governments in this area.

This year, the federal government will pay 71 per cent of the cost of inspection and testing with the remaining 29 per cent being shared by the growers and provincial governments. The provincial governments of New Brunswick

and P.E.I. have agreed to cover part of the grower costs and I would welcome similar arrangements in other provinces.

In 1983, the federal government will pay 50 per cent of the costs, with the growers and provinces combining to pay the other half. As it stands now, the provincial governments of New Brunswick and P.E.I. plan to pay 20 per cent and the growers 30 per cent of the costs.

All this will be based on a cost of $125 per hectare, meaning that the federal government will pay $62.50 and the growers and the provinces the other 50 per cent.

The federal government cannot be expected to carry a larger portion of the costs. In fact, there has been severe criticism from our competitors about this. The State of Maine feels government-financied certification services are another form of Canadian subsidization. The absence of fees in the past has been interpreted by the Europeans as part of the reason Canada can undercut their prices.

To put these fees into better perspective, on the basis of an average yield of 550 hundredweight per hectare, the cost of these fees to growers would amount to 11.5 cents a hundredweight. With provincial assistance, this falls to below seven cents.

In comparison, in all 18 seed-producing states of the U.S., a fee is charged which averaged 10 cents a hundredweight in 1978 and since then, the fee has risen by between 20 and 50 per cent. And Dutch producers pay, on the average, about $155 per hectare for inspection, while the Dutch government pays another $155. This, however, depends on the producer's yields and can be even more in good years.

So anyway you look at it, it still is a good deal.

I might add that because of our commitment to cost recovery, Treasury Board approved 10 additional person-years and $513,000 to help get these new inspection efforts off the ground.

With some of this money, we are building two new laboratories for post-harvest testing -- one in Fredericton, the other in Charlottetown. The Fredericton lab is costing us $168,000 not including $50,000 for the testing equipment, and it is expected to open this June. The Charlottetown lab will cost $115,000 plus the cost of the equipment.

Initially, the laboratory testing will be run with the Florida tests to assure their accuracy. But by 1984, it is our plan to completely eliminate the costly, slower Florida growing trials in favour of the lab tests.

Such a switch will provide our marketers with the disease data they require for international markets just a few weeks following harvest, instead of waiting until February for this information as is now the case.

It upsets me to see our competitors getting 30 to 40 per cent more for their seed potatoes than Canadian producers do. It is even more upsetting when you realize that it's not because of a difference in quality, but because of our own marketing practices.

Holland, by far the largest exporter of seed potatoes, co-ordinates its marketing efforts. Their exporters also compete with each other, but not to the extent that Canadian exporters do. We all know that our exporters often find themselves bidding against one another, pushing the price of our potatoes down, sometimes below cost. The sad part about this destructive form of competition is that it has not helped in increasing our export sales. Our major competitors simply turn the tables on us by using the sales pitch that our prices are lower because our quality is lower.

Yet, our inspection and grading system is second to none. We provide a high quality product. What we need is a little more co-ordination of marketing and a lot less destructive competition with one another.

Through presenting such a united front, we were able to protect our seed exports to the United States -- our major customer. As you know, last November, Maine imposed new health regulations requiring Maritime seed potato shipments in transit through the state to be sealed at their point of entry and unsealed as they left the state. For this, they charged us $200 per shipment.

I was happy to see the American government take the view that these regulations interfered with interstate and international trade and that a federal district judge imposed a temporary injunction against these regulations. I am hopeful this injunction will become permanent this spring.

We are also making progress in the form of a marketing agency for potatoes. While I was hoping to see such an agency in place sooner, the five eastern provinces are looking at the latest draft right now and I hope a final meeting will be arranged for the signing of an agreement by spring. There are still some demands for a Commission to look into the potato marketing system and I am still looking into this possibility, if it is necessary, to get an agency off the ground.

I think a few words about the Market Risk Plan for seed potatoes are necessary.

The objective of this plan is to reduce the negative impact of highly fluctuating seed potato prices on growers and the quality of seed. You are probably aware that officials of my department together with New Brunswick officials and producer representatives have worked hard in the past year to develop an acceptable plan. Last December, a draft proposal was agreed upon in principle. It was decided that this draft would be submitted to the N.B. growers and would be submitted to Treasury Board for their consideration.

Unfortunately, we were informed that, as a result of a recent ruling by the Speaker of the House of Commons regarding spending under the Appropriations Act, the federal government needs special legislation. Without it, we cannot contribute to a Market Risk Plan. I have, therefore, instructed my officials to draft a Memorandum to Cabinet to request authority for the drafting of the necessary legislation. As this is a relatively long process, we shall not be able to implement the plan for the next marketing year as intended.

There is no reason for us to be timid on world markets when it comes to seed potatoes. It's time we exhibit a little of that determination and pride our forefathers shared. It's this pride that has continued to ensure the high quality of all our agricultural products and has made Canada a world leader in food production.

No matter where I go in the world, I'm always told how fortunate we are to be Canadians. And these people can't understand why we're always arguing with each other. And I agree with them.

We should all be proud of being Canadian and proud of what we can do as Canadians. One thing we are recognized for around the world is our expertise in agriculture.

With this extensive seed potato program in place, and with the assistance that can be provided by CANAGREX, I am confident that Canada will become the leading world exporter of high quality seed potatoes. There are potential and developing markets in Africa, Asia, the Caribbean, South America, the United States and Europe.

And if the problems of the seed potato industry can be overcome, we could double the value of our exports by 1985 to about $35 million annually. That's no dream; that's what can be done, if we continue to work together as we have in the past.

Thank you.

MAKING COMPUTERS WORK FOR YOU

Ross Lister
Supervisor - Farm Management
N.B. Department of Agriculture

It has been said and believed by people much more knowledgeable than I that computers will be the cause of the next revolution in Agriculture.

Why then, this sudden interest from Agriculture? Simple! Farmers are smart and know a good thing when they see it, and therefore we are seeing an explosion of interest in harnessing the power of the desktop computer for farm management.

Why this sudden interest from Agriculture America's largest industry, when the rest of the country has been computerized for over two decades?

3 Factors

1. In the 1950's and 60's farmers could improve their income by simply adopting new production practises, the 70's brought a realization that yields and performances were starting to plateau as we reached the existing potentials.

2. Also in the 70's we saw violent changes in commodity markets production costs and farmland prices. This created a growing interest in marketing and financial planning, to the point that by the end of the 70's management ability was no longer only a desirable skill, but a prerequisite for survival.

3. During the past 5 years computers have been dropping in price while increasing in power. While software is still lagging behind hardware development, there has been tremendous advancements resulting in exciting aids being available now.

Within a short time, the on-farm computer will become the most indispensible machine on the farm. The 4 wheel drive tractor may run only a few days out of the year, but the computer will be used every day.

Computers are no different than any other farm machine - you use them to replace labour with capital.

It therefore must do a chore which is presently being done manually or which can't be done manually because of the complexity.

Like any other machine it must pay for itself, the ways it can do this are simple - time saved and improved information.

Again I must stress it replaces and improves what is being done manually. Computers will not make managers, rather they will only assist managers in simplifying tasks and improving the information required for making management decisions.

Exposure to a new technology requires periods of adjustment. It is important to recognize that for most, understanding and becoming familiar with a new system will be a gradual process. Progress and advancement must be matched with willingness and capability to learn and accept.

Having said all this I would like to briefly mention some specific areas where micro-computers are used on actual farm functions:

1. Financial Reports
   - Income and Expense records
   - Accts. Payable and Receivables
   - Cash Flows
   - Tax records
   - Machinery costs
   - Production costs

2. Physical Records
   - Animal & Crop Production Records
   - Inventory Records

3. Decision Aids
   - Cash Flow Planning
   - Least cost feed formulation
   - Loan activities
   - Buy vs. Hire programs
   - Land purchase programs
   - Budgeting

4. Information Systems
   - Climatic data
   - Commodity Market Info
   - Commodity Outlook Information
   - Buying and Selling (Classified Ads)
   - Agricultural Practises
     Ex. Herbicide, and insecticide application

These are but a few of the uses, having mentioned these, I suspect you can quickly think of other ways micros can be used on your own farm, and most likely you are right. The limits are only restrained by one's imagination and the ability to purchase or program the software to make it happen.

It is predicted that within the next five years that approximately one third of the farms in U.S. will be using a micro on their farm. I see no reason to believe the situation will be any different here in N.B. Already we know of different farms throughout N.B. which are presently using such systems, so we are not talking about a technology of the future but one of today.

Realizing that a lot of you here today will be utilizing micro-computers on your farms in the very near future, our Farm Management Division has already purchased two systems and hope to have systems in each region within the year.

We see as our role, an opportunity to provide resources in the area of training and program development (software) to assist N.B. farmers in this new field of farming technology.

FEEDING CULL POTATOES TO BEEF CATTLE

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Cull potatoes are an excellent and economical source of feed energy for all types of cattle. They are especially useful as a substitute for expensive grain in fattening beef cattle and for lactating dairy cows.

Cattle find potatoes highly palatable and will eat large amounts of them each day. Fattening beef cattle will easily eat 10% of their body weight each day. That means a 1000 lb steer will eat 100 lb of potatoes a day. We have fed dairy cows over 100 lb a day in experiments conducted some years ago at Charlottetown.

Potatoes are not a perfect balanced feed and for most efficient utilization they require supplementation with fiber, protein, minerals and vitamins. For this reason, if no other, it is best not to try for maximum levels of potato intake per day. The 100 lb per day I mentioned are extremes and for a general practice I would recommend feeding lower levels -- perhaps half of the maximum level. This makes it easier to balance the ration for all the different nutrients needed and animals often do better when given a variety of feeds.

The dry matter of potatoes is very similar to that of corn grain in nutrient content. Because potatoes contain just a little over 20% dry matter (80% water) and corn grain about 90% dry matter (only 10% water) it takes about 4.5 lb of fresh

potatoes to equal the feed value of 1 lb of corn grain. Corn grain is now selling for about $190 per metric ton. This means the comparable feed value of potatoes in the feed bunk is just under 2¢/lb (1.9¢/lb) (4.2¢/kg).

Although the feed value of potatoes relative to grain is close to 2¢/lb, cattle feeders will not likely pay this much. If prices are equal, most people would prefer to feed grain--it is easier to handle, lighter, no danger of choking, can stand freezing, will keep for long periods of time without sepcial storage. Feeding potatoes on the other hand, often requires a change in feeding procedures. If feeding is done with a mixer wagon, the potatoes can be added relatively easily. If whole potatoes are fed separately, care must be taken to minimize the danger of choking.

Choking is most likely to occur when hungry cattle are fed whole potatoes in a confined area where they compete with each other for the supply. We have always fed potatoes whole at the Research Station in Fredericton and we have never lost an animal from choking. Our animals are usually tied up and fed individually but even when we have group fed animals we have not had trouble. We usually feed potatoes after the cattle have had access to hay or silage so that they are not especially hungry and we make sure that there is plenty of room for all cattle to eat at once without pushing and shoving. With reasonable precautions, there is little danger from choking. However, it is probably a good precaution to feed potatoes early in the day when someone is around to observe the animals and give help if needed.

One other question I am usually asked is what danger is there in feeding sunburned or sprouted potatoes? We know that sunburned (green colored) potatoes and potato sprouts contain toxic glycoalkaloids--solanine and related compounds. The ruminant animals are fairly resistant to this toxin because the microorganisms in the rumen are able to reduce the toxicity. We have not observed any ill effects from feeding cull potatoes containing the usual amount of sunburned tubers. I would avoid feeding potatoes from the outside edge of a pile that had been left exposed to the sun and that had green sprouts on them.

Also, we have not seen any ill effects of feeding potatoes coming out of storage with small, white sprouts. I would not feed sprouts that were removed from potatoes during grading. These should be disposed of other than by including them in the culls to be fed to cattle. The chief danger of glycoalkaloid toxicity comes from feeding sprouted, cull potatoes left exposed to light long enough to turn green.

Another concern by some people is the possible concentration of pesticide residues from potatoes in the meat or milk. A case of residues from potatoes contaminating cattle in British Columbia a few years ago received wide publicity. In the B.C. case, it was not a potato pesticide that caused the trouble. As long as approved pesticides are used according to recommendations, there is no danger from residues.

Frozen potatoes can be fed to livestock but the danger from choking is greatly increased if they are fed while still frozen. We have fed frozen potatoes by allowing them to thaw and feeding them as soon as they became soft but before the juice starts running out. These just thawed potatoes do not seem to be very palatable but the cattle will eat them when they are mixed with silage or other feed.

Cattle should not be expected to eat badly rotted potatoes but the odd rotten potato in with the culls does not seem to cause any harm.

Potatoes are a highly digestible energy source for cattle. As such they are a replacement for grain not forages in the diet. It has already been pointed out that it takes about 4.5 lb of potatoes to equal the energy value of 1 lb of grain because of the difference in dry matter content. As with any high energy feed cattle must be accustomed to eating them over a considerable period of time. Heavy cattle or milking cows can be started with about 15 lb of potatoes per day. When they are eating this amount regularly the amount fed can be increased 2 or 3 lb a day until the desired level of feeding is reached.

Storage of cull potatoes can be a problem on many livestock farms which do not have frost-free storage. Also, potatoes often become available in the spring when cattle are being turned out to pasture. With abundant fresh grass available, and the rush of spring work, people often do not want to be bothered feeding potatoes every day. Potatoes cannot be held in ordinary storage over the summer for feeding the next fall or winter. One way of keeping potatoes over the summer is to ensile them.

Potatoes cannot be ensiled alone. They must be mixed with dry chopped hay or straw to increase the dry matter content and to give the silage body so it can be handled with regular silage equipment. At Fredericton we have made potato-hay silage by spreading potatoes over the bottom of self-unloading silage wagon. Dry baled hay was then chopped with a forage harvester and blown into the wagon on top of the potatoes. The load was leveled and augered into a silage blower and blown into an upright silo. The blower completed the mixing of the hay and potatoes and pulped the potatoes in the process. The biggest pieces of potato that you could find in the silo were about the size of a thumb nail. The potatoes must be free of stones for this procedure to work without damage to the blower.

Our first experiment with potato-hay silage was in 1975. The silage was made in October and fed to steers that winter. The steers were fed 1.1 lb (0.5 kg) per day of a commercial protein-mineral-vitamin supplement containing 48% crude protein. Half of the steers were fed all the potato-hay silage they would eat and the other half were given corn silage during the experiment which lasted 105 days.

The performance data are shown in Table 1. The average daily gain of the steers was almost identical for the two silage rations but the steers fed the potato-hay silage ate more dry matter per day. This meant that the efficiency of converting feed to weight gain was lower for the potato-hay silage. This is probably a reflection of the fairly low-quality hay mixed with the potatoes to make the silage.

Ideally, the potatoes should be mixed with a high-quality legume hay for the silage. Legumes are high in the minerals calcium and magnesium that are low in potatoes and legumes can provide some of the supplemental protein required with potatoes.

Our initial experiments showed that excellent silage can be made from potatoes and hay ensiled in the fall while the weather was reasonably warm. Cull potatoes from grading operations become available throughout the winter. We wanted to know if it was possible to ensile these culls with chopped hay during cold weather. In February, 1979, we made potato-hay silage using a 3:1 mixture of potatoes to hay. In one silo we mixed the potatoes with legume hay (14% crude protein) and in another we used timothy hay (8% crude protein).

The silages were fed to steers in the spring. They were fed 2.2 lb (1 kg) per head per day of a supplement containing 30% crude protein and all the silage they would consumer. The experiment only lasted 43 days.

The chemical composition of the silages is shown in Table 2. The data show the silages fermented satisfactorily as the pH was in the normal silage range of 4.4 to 4.5, lactic acid content was normal at 3.3-4.0% of dry matter and the content of ammonia nitrogen was relatively low. The dry matter content was 36-38% and, as expected, the crude protein content of the legume silage was higher than for the grass.

The steer performance data in Table 3 show that there was little difference between the two silages in silage dry matter consumption per day by the steers. The ones fed the silage made with timothy gained a little faster and had a better efficiency of feed conversion to weight gain but a large part of this was gut fill. The steers fed the legume-potato silage had a lower dressing percentage and lower carcass weight than those fed the legume-potato silage. We had expected a bigger advantage for the legume-potato silage. However, all the steers did fairly well at about 1 lb a day gain considering the low level of grain fed.

The further experiment was set up to compare two ratios of potatoes to hay. Most people want to feed as high a ratio as possible in order to use up the potatoes and also to increase the energy value. In this experiment we made silages with potatoes to hay ratios of 3:1 and 5:1. The hay was timothy with 9.7% crude protein. The silages were made in November 1979 and there was considerable seepage from the 3:1 silage.

The silages were fed out starting in May and the feeding period was 57 days. The steers were fed one of three rations: (1) 3:1 silage ad libitum plus 2.5 kg of concentrate A (Table 1), (2) 5:1 silage ad libitum plus 2.5 kg of concentrate A, and (3) 5:1 silage ad libitum plus 0.5 kg of concentrate B. It was anticipated that the steers fed treatments 1 and 3 would have similar weight gains while those on treatment 2 would have higher weight gains.

The two supplements were designed to supply the same amount of crude protein, minerals and vitamins per animal per day but supplement A provided more energy as it was fed at 2.5 kg per day compared to 0.5 kg for supplement B.

The results shown in Table 5 bare out our expectations. Steers fed the 5:1 silage with the low level of supplement B ate more silage dry matter but less total dry matter than steers fed either 5:1 or 3:1 silage with the higher level of supplement A. Weight gains were not significantly different for steers fed the 3:1 silage with 2.5 kg of supplement and those fed the 5:1 silage with 0.5 kg of supplement. Steers fed both the high-energy (5:1) silage and 2.5 kg of supplement gained the fastest and had the most efficient feed conversion. The feed costs of gain were lowest for the 5:1 silage fed with a low level of supplement.

Because of the high seepage from 5:1 silage, this level of potatoes to hay is probably too high. We recommend that a ratio of 4 lb of potatoes to 1 lb of hay is probably ideal in terms of energy level and avoidance of seepage.

We would sum up the advantages of ensiling potatoes with hay as follows:

1. Provides long-term storage.
2. Danger of freezing is eliminated.
3. Danger of choking is eliminated.
4. Time saved at feeding.

Ensiling does not improve the feeding value of either the potatoes or the hay. In fact, some energy value is lost due to the fermentation that occurs in the silo. If there is no need to store the potatoes over summer or if the convenience of feeding silage is not important, it is best to feed potatoes fresh.

The results that can be expected from feeding fresh potatoes can be illustrated by data from a feeding trial we ran several years ago. The steers were fed 27.5 lb (12.5 kg) of whole potatoes, 1.1 lb (0.5 kg) of a supplement and all the timothy hay they would eat. The hay was fed in five different forms:

1. Long
2. Ground - 1/2" screen in hammermill
3. As 2 with water added to reduce dust (50% by weight)
4. As 2 mixed with pulped potatoes
5. As 2 pelleted, 0.5 cm die

The animal performance is shown in Table 6. The calves fed were 7 to 8 months old averaging 500 lb in weight at the start. The feeding period lasted 60 days. The timothy hay was second cut with 9.7% crude protein in the dry matter. The hay intake was a bit above 1% of body weight for the long hay and was not increased significantly by grinding it through a 1/2" screen, or by moistening the ground hay to reduce dustiness or by mixing it with pulped potatoes. Pelleting the ground hay did give a significant increase in daily intake and increased rates of gain from 2.2 lb (1 kg) per day on the long hay to 2.9 lb (1.3 kg) on the pelleted hay. Although pelleting would seem to result in an improvement in animal performance, no farms in this area are equipped to pellet hay.

The performance of the animals on long hay, supplement and potatoes was not bad and the gains were economical. If the hay and supplement are priced at $60 and $325 per ton, the daily feed costs are 19¢ for hay and 18¢ for supplement--a total of 37¢--for 2.2 lb gain or 17¢ per pound. On top of this you have to add the cost of 12.5 lb of potatoes per pound of weight gain. In many cases, the potatoes are available for the cost of hauling or maybe 1¢ per pound. In either case, the feed costs of beef weight gain is very low when potatoes are fed.

I understand that the records obtained through the technology transfer project at the Everett Farm feedlot bare out the results we found in our research and show feed costs of less than 50¢ per pound of gain. I doubt that any place else in Canada has feed costs this low. If Ontario or Alberta cattle feeders knew we had this feed resource and were not taking advantage of it, they would be quick to move in and start feeding cattle here.

In addition to culls, there are vast quantitites of potato processing wastes generated in this province. The best of these wastes are used in the McCain feedlot or go to Maine for dehydrating. However, there is still a lot of good feed that goes to land fill. This waste is low in dry matter and would have to be handled as a slurry. Feeding systems would have to be changed to include a mixer wagon or some means of mixing the slurry with dry feed. It would require a new approach to feeding but the opportunity is there for someone.

A new development we are watching with interest is the possibility of using steam peel waste for pig feed. In a small scale test we did at the Fredericton Research Station, we found pigs would eat up to 25% of the dry matter in their ration from steam peel waste. The dry matter of the peel was digested to extent of about 81% compared to 85.5% for the control barley based grower. The crude protein content of the peel waste was about 17% of the dry matter. Even though it was only digested to the extent of 61%, the potato steam peel waste contributed significant digestible protein to the ration. There is need for on-farm trials to see if these encouraging results can be duplicated on a practical scale.

Cull potatoes and processing by-products represent a very valuable feed resource for livestock feeders. It is in the best interest of potato growers to encourage the use of this material as feed rather than discarding it in dumps where it can serve as a source of disease for the next year's crop or maybe contaminate water supplies.

SOIL LIME AND SUB-SOILING PROJECTS

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The Effect of Subsoiling Compacted Eroded Potato Soils in New Brunswick Prior to Planting and Post Planting - R.P. Hinds

The general effect of subsoiling to a depth of 45 cm on eroded potato soils of the Holmesville soil series (a podzol) is being observed over two years on three locations. At two locations, plots were 1) spring subsoiled, spring ploughed and harrowed; 2) spring ploughed and harrowed (standard method); and 3) spring subsoiled and harrowed twice to form a seedbed. At the other location, subsoiling was done in the growing crop between the rows prior to and after flowering. Non-subsoiled plots had a bulk density of 1.2-1.25 g/cm^3. This was 13 to 24% higher than subsoiled plots.

Infiltration rates on non-subsoiled treatments were 7 to 8.5 cm/hour. Subsoiled treatments increased the infiltration rate by 2 to 3 times, indicating a drastic reduction in runoff, an important agent of erosion on New Brunswick potato soils. Rooting depth and percentage moisture were increased on subsoiled areas.

When subsoiling was done prior to planting, yield increases of 7 to 16% over non-subsoiled treatments were realized, though this trend was not always consistent. There was a yield decline of 10% when subsoiling was done prior to flowering.

On soils with compacted subsoils and on compacted soils protected by diversion terraces, subsoiling could reduce runoff, through increased infiltration and reduction of compaction. Additional benefits from increased yields would also accrue.

High Applications of Limestone to Two Varieties of Potatoes Grown on Eroded Podzols

Five locations for the Holmesville soil series (an eroded podzol) were selected in 1980. The treatments were applied as follows: 0,4.48, 9.96, 13.44 and 17.92 tonnes/ha of both dolomitic and calcitic limestone. Russet Burbank and Kennebec were the varieties used. Treatments with 4.48 and 8.96 tonnes/ha of gypsum were also simultaneously incorporated into the project. The purpose of the project is to observe and test potato yield and quality (scab incidence), to evaluate the nutrient status of potato petioles and to assess the economics of production under the petioles and to assess the economics of production under the different treatments.

After two consecutive years, 9.96 tonnes/ha of dolomitic, calcitic and gypsum treatments seem to be producing a higher yield with a better size distribution and higher specific gravity than 0, 13.44 and 17.92 tonnes/ha of limestone. Crop growth was reduced and the crop matured 2 to 3 weeks earlier on the 13.44 and 17.92 tonnes/ha limestone treatments. Some Kennebec plots produced very mild scab lesions. Russet Burbank exhibited no incidence of scab. In the 8.96 to 17.92 tonnes/ha treatments, the pH was about 7.0 or over and in all

other treatments, the pH was 6.0 or under. Calcium levels increased three-fold from 1980 levels under the high levels of calcitic limestone and magnesium levels showed the same trend for the dolomitic treatments.

Ca/Mg. and Mg/K. ratios of 5 to 1 and 2 to 1 respectively are considered normal and these ratios were maintained under the dolomitic limestone treatments. 17.96 tonnes/ha calcitic limestone pushed the Ca/Mg. ratio up to 25 to 1 causing a drastic reduction in K uptake, diagnosed from leaf petiole analysis.

At the end of the third year, these yields will be analyzed as a serial experiment to examine differences due to location, treatment, years and treatment x years.

FLORIDA TEST REPORT

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Table I. 1981 Florida Test Averages of Selected Varieties.

Table II. Florida Test Averages - 1973-1981. The 1981 results are approximately equal to the 1979 results, which are considered to be a year in which very good seed was available. Superiors showed an increase over 1979 but this is due to the increase in the Certified class.

Table III. 1981 Florida Test Averages - By Class. The expected trend of increased disease levels as seed drops in class is shown. The exception is the higher reading for Elite I Russet Burbank.

Table IV. Composite Results - 1978-81 - Russet Burbank. Leafroll shows a slight increase in all classes except Certified. Mosaic showed slight increases in the Elite I, Foundation and Certified classes.

Table V. Composite Results - 1978-81 - Red Pontiac. Leafroll remained at a low level. Mosaic essentially remained the same.

Table VI. Composite Results - 1978-81 - Superior. Leafroll has remained steady. Mosaic showed a slight increase in Elite III and a substantial increase in the Certified class.

Table VII. Composite Results - 1978-81 - Kennebec. Leafroll showed a slight increase in Elite I but declined in all other classes. Mosaic as expected remains low.

Table VIII. Composite Results - 1978-81 - Katahdin. Leafroll showed a slight increase in the Elite II class but declined in the Elite III and Foundation classes.

Table IX. 1981 Florida Test Averages by County - Leafroll. The historical trend of higher leafroll readings in Carleton County continued for the Russet Burbank, Superior and Katahdin varieties. There were no differences with the Kennebec or Pontiac varieties. Trends in Madawaska County varied.

Table X. 1981 Florida Test Averages by County - Mosaic. The historical trend for higher mosaic readings held only for the Red Pontiac variety. The Superior variety showed slightly more mosaic in Carleton County. Results for Madawaska County varied.

Table XI. 1981 Florida Test Averages - Foundation Class - N. Dakota - N.B. N.B. readings higher than N. Dakota. There was a 1981 increase of approximately 1% in both sources of seed.

FLORIDA TEST - 1981

AVERAGES - %

	SAMPLES	LEAFROLL	MOSAIC	SPINDLE TUBER
Russet Burbank	158	0.48	1.76	0.00
Kennebec	216	0.13	0.01	0.00
Red Pontiac	112	0.02	0.86	0.00
Superior	126	0.16	1.33	0.00
Katahdin	33	0.24	0.02	0.00

FLORIDA TEST - 1973 - 1981

	SAMPLES	LR	MOSAIC	SPT	TOTAL
Russet Burbank					
1981	158	0.48	1.76	0.00	2.24
1980	152	0.06	2.32	0.00	2.38
1979	132	0.29	1.57	0.002	1.862
1978	110	0.8	10.3	0.0	11.1
1977	105	0.4	7.0	0.001	7.401
1976	57	1.2	9.3	0.008	10.508
1975	27	10.8	5.5	0.0	16.3
1974	34	4.7	2.2	0.08	6.98
1973	18	2.2	0.6	0.0	2.8
Red Pontiac					
1981	112	0.02	0.86	0.00	0.88
1980	79	0.03	1.75	0.0	1.78
1979	46	0.11	0.79	0.0	0.9
1978	40	0.1	3.4	0.0	3.5
1977	47	0.07	3.9	0.0	3.97
1976	17	0.1	3.5	0.0	3.6
1975	13	0.8	1.5	0.0	3.6
1974	10	0.3	0.7	0.0	1.0
1973	9	0.1	0.1	0.0	0.2

FLORIDA TEST - 1973 - 1981

	SAMPLES	LR	MOSAIC	SPT	TOTAL
KENNEBEC					
1981	216	0.13	0.01	0.00	0.14
1980	161	0.06	0.00	0.00	0.05
1979	128	0.21	0.04	0.01	0.26
1978	65	0.4	0.03	0.0	0.43
1977	67	0.4	0.06	0.0	0.46
1976	37	0.9	0.05	0.01	0.96
1975	23	1.2	0.06	0.1	1.36
1974	28	1.1	0.001	0.03	1.131
1973	23	1.2	0.05	0.2	1.45
KATAHDIN					
1981	33	0.24	0.02	0.00	0.26
1980	24	0.31	0.03	0.00	0.34
1979	24	0.24	0.04	0.0	0.28
1978	10	0.5	0.3	0.0	0.8
1977	12	0.5	0.1	0.0	0.6
1976	12	0.6	0.1	0.0	0.7
1976	13	4.9	0.2	0.0	5.1
1974	14	1.3	0.1	0.0	1.4
1973	12	0.6	0.1	0.02	0.72
SUPERIOR					
1981	126	0.16	1.33	0.00	1.49
1980	60	0.01	0.09	0.00	0.10
1979	51	0.14	0.79	0.01	0.94
1978	24	0.3	5.5	0.0	5.8
1977	18	1.1	1.2	2.38	4.68

1981 FLORIDA TEST - AVERAGE

	CLASS	SAMPLES	LR	MOS	SPT	TOTAL
RUSSET BURBANK	E_1	7	0.39	0.81	0.00	1.20
	E_2	13	0.18	0.29	0.00	0.47
	E_3	64	0.46	1.52	0.01	1.99
	F	60	0.53	1.93	0.00	2.46
	C	15	0.73	3.87	0.00	4.60
KENNEBEC	E_1	9	0.14	0.00	0.00	0.14
	E_2	19	0.12	0.00	0.00	0.12
	E_3	79	0.09	0.02	0.00	0.11
	F	106	0.17	0.00	0.00	0.17
	C	2	0.00	0.00	0.00	0.00
RED PONTIAC	E_1	7	0.00	0.25	0.00	0.25
	E_2	12	0.00	0.44	0.00	0.44
	E_3	43	0.02	0.93	0.00	0.95
	F	49	0.03	0.95	0.00	0.98
	C	1	0.00	2.75	0.00	2.75
SUPERIOR	E_1	5	0.00	0.00	0.00	0.00
	E_2	8	0.09	0.22	0.00	0.31
	E_3	56	0.16	0.85	0.00	1.01
	F	51	0.19	1.51	0.00	1.70
	C	6	0.12	6.96	0.00	7.08
KATAHDIN	E_1	2	0.00	0.00	0.00	0.00
	E_2	5	0.15	0.00	0.00	0.15
	E_3	18	0.14	0.01	0.00	0.15
	F	8	0.59	0.06	0.00	0.65

COMPOSITE RESULTS - 1978-81

	SAMPLES	LR	MOSAIC	SPT	TOTAL
E_1 R. BURBANK					
1981	7	0.39	0.81	0.0	1.20
1980	5	0.0	0.15	0.0	0.15
1979	8	0.31	0.52	0.0	0.83
1978	5	0.6	1.8	0.0	2.4
E_2 R. BURBANK					
1981	13	0.18	0.29	0.00	0.47
1980	14	0.06	0.66	0.0	0.72
1979	9	0.03	1.11	0.0	1.14
1978	9	0.2	3.3	0.0	3.5
E_3 R. BURBANK					
1981	64	0.46	1.52	0.01	1.99
1980	64	0.05	2.42	0.0	2.47
1979	43	0.18	1.82	0.0	2.0
1978	25	0.7	7.4	0.0	8.1
F R. BURBANK					
1981	60	0.53	1.93	0.00	2.46
1980	54	0.05	2.77	0.0	2.83
1979	62	0.27	1.28	0.0	1.56
1978	59	0.7	11.7	0.0	12.4
C R. BURBANK					
1981	15	0.73	3.87	0.00	4.60
1980	15	0.16	2.47	0.0	2.63
1979	10	1.09	3.56	0.03	4.68
1978	12	2.3	21.5	0.0	23.8

COMPOSITE RESULTS - 1978-81

	SAMPLES	LR	MOSAIC	SPT	TOTAL
E_1 RED PONTIAC					
1981	7	0.0	0.25	0.0	0.25
1980	4	0.0	0.65	0.0	0.65
1979	5	0.1	0.21	0.0	0.31
1978	2	0.0	1.0	0.0	1.0
E_2 RED PONTIAC					
1981	12	0.0	0.44	0.0	0.44
1980	14	0.03	0.86	0.0	0.89
1979	9	0.21	0.57	0.0	0.78
1978	7	0.1	1.6	0.0	1.7
E_3 RED PONTIAC					
1981	43	0.02	0.93	0.0	0.95
1980	39	0.02	1.99	0.0	2.01
1979	19	0.08	1.01	0.0	1.09
1978	20	0.2	3.2	0.0	3.4
F RED PONTIAC					
1981	49	0.03	0.95	0.0	0.98
1980	20	0.04	1.71	0.0	1.75
1979	13	0.08	0.84	0.0	0.92
1978	11	0.1	5.2	0.0	5.3

COMPOSITE RESULTS - 1978-81

		SAMPLES	LR	MOSAIC	SPT	TOTAL
E_1	SUPERIOR					
	1981	5	0.0	0.0	0.0	0.0
	1980	3	0.0	0.0	0.0	0.0
	1979	4	0.0	0.0	0.0	0.0
	1978	2	0.0	0.6	0.0	0.6
E_2	SUPERIOR					
	1981	8	0.09	0.22	0.0	0.31
	1980	4	0.0	0.05	0.0	0.05
	1979	3	0.0	1.17	0.0	1.17
	1978	2	0.0	0.3	0.0	0.3
E_3	SUPERIOR					
	1981	56	0.16	0.85	0.0	1.01
	1980	37	0.01	0.08	0.0	0.09
	1979	32	0.11	0.53	0.1	0.73
	1978	10	0.2	1.9	0.0	2.1
F	SUPERIOR					
	1981	51	0.19	1.51	0.0	1.70
	1980	16	0.02	0.14	0.0	0.16
	1979	9	0.41	1.59	0.08	2.09
	1978	8	0.4	11.2	0.0	11.6
C	SUPERIOR					
	1981	6	0.12	6.96	0.0	7.08
	1980	-	-	-	-	-
	1979	3	0.15	1.83	0.0	1.98
	1978	2	0.8	10.6	0.0	11.4

COMPOSITE RESULTS - 1978-81

		SAMPLES	LR	MOSAIC	SPT	TOTAL
E_1	KENNEBEC					
	1981	9	0.14	0.0	0.0	0.14
	1980	4	0.0	0.0	0.0	0.0
	1979	12	0.02	0.04	0.0	0.06
	1978	6	0.2	0.0	0.0	0.2
E_2	KENNEBEC					
	1981	19	0.12	0.0	0.0	0.12
	1980	23	0.04	0.0	0.0	0.04
	1979	16	0.16	0.0	0.0	0.16
	1978	10	0.1	0.0	0.0	0.1
E_3	KENNEBEC					
	1981	79	0.09	0.02	0.0	0.11
	1980	89	0.06	0.0	0.0	0.06
	1979	63	0.23	0.04	0.0	0.27
	1978	26	0.4	0.05	0.0	0.45
F	KENNEBEC					
	1981	106	0.17	0.00	0.0	0.17
	1980	43	0.04	0.0	0.0	0.04
	1979	34	0.26	0.05	0.05	0.36
	1978	18	0.3	0.02	0.0	0.32
C	KENNEBEC					
	1981	2	0.0	0.0	0.0	0.0
	1980	2	0.0	0.0	0.0	0.0
	1979	3	0.07	0.07	0.0	0.14
	1978	4	2.3	0.2	0.0	2.5

COMPOSITE RESULTS - 1978-81

	SAMPLES	LR	MOSAIC	SPT	TOTAL
E_1 KATAHDIN					
1981	2	0.0	0.0	0.0	0.0
1980	2	0.0	0.0	0.0	0.0
1979	6	0.0	0.0	0.0	0.0
1978	1	0.7	0.0	0.0	0.7
E_2 KATAHDIN					
1981	5	0.15	0.0	0.0	0.15
1980	8	0.0	0.0	0.0	0.0
1979	3	0.0	0.0	0.0	0.0
1978	3	0.1	0.0	0.0	0.1
E_3 KATAHDIN					
1981	18	0.14	0.01	0.0	0.15
1980	11	0.0	0.06	0.0	0.06
1979	12	0.26	0.09	0.0	0.35
1978	4	0.6	0.0	0.0	0.6
F KATAHDIN					
1981	8	0.59	0.06	0.0	0.65
1980	2	0.0	0.0	0.0	0.0
1979	3	0.86	0.0	0.0	0.86
1978	1	0.2	1.3	0.0	1.5

FLORIDA TEST - COUNTY AVERAGES - LEAFROLL

	1975	1976	1977	1978	1979	1980	1981
R. BURBANK							
VICTORIA	1.79	0.52	0.1	0.2	0.16	0.01	0.40
CARLETON	13.51	0.96	0.6	1.3	0.35	0.10	0.56
MADAWASKA							0.55
KENNEBEC							
VICTORIA	0.78	0.52	0.6	0.34	0.20	0.05	0.15
CARLETON	1.97	1.39	0.5	0.9	0.34	0.04	0.12
MADAWASKA							0.08
KATAHDIN							
VICTORIA	1.09	0.0	0.35	0.6	0.22	0.00	0.05
CARLETON	10.38	1.17	0.6	0.6	0.26	0.75	0.54
MADAWASKA							-
PONTIAC							
VICTORIA	0.74	0.08	0.09	0.08	0.08	0.02	0.02
CARLETON	0.79	0.17	0.07	0.02	0.16	0.03	0.02
MADAWASKA							-
SUPERIOR							
VICTORIA			0.5	0.2	0.12	0.02	0.11
CARLETON			2.3	0.4	0.10	0.01	0.19
MADAWASKA							0.13

FLORIDA TEST - COUNTY AVERAGES - MOSAIC

	1975	1976	1977	1978	1979	1980	1981
R. BURBANK							
VICTORIA	3.72	8.49	9.3	10.5	2.11	3.86	1.77
CARLETON	4.88	7.34	6.0	9.7	1.18	1.29	1.79
MADAWASKA							2.75
KENNEBEC							
VICTORIA	0.06	0.03	0.07	0.03	0.05	0.00	0.02
CARLETON	0.06	0.08	0.06	0.00	0.02	0.00	0.00
MADAWASKA							0.00
KATAHDIN							
VICTORIA	0.15	0.09	0.00	0.9	0.03	0.02	0.01
CARLETON	0.16	0.12	0.1	0.0	0.05	0.04	0.04
MADAWASKA							-
PONTIAC							
VICTORIA	1.56	5.94	4.4	4.8	0.83	2.07	1.04
CARLETON	1.45	0.75	4.0	2.5	0.84	1.64	0.76
MADAWASKA							-
SUPERIOR							
VICTORIA			1.4	5.6	0.85	0.11	1.42
CARLETON			1.4	6.8	0.71	0.07	1.50
MADAWASKA							0.54

FLORIDA TEST - 1978-81

RUSSET BURBANK	SAMPLES	LR	MOS	SPT	TOTAL
North Dakota					
1978	54	0.8	11.8	0.0	12.6
1979	53	0.19	0.64	0.0	0.83
1980	20	0.003	2.05	0.0	2.053
1981	23	0.13	0.58	0.0	0.71
New Brunswick					
1978	14	1.6	15.8	0.0	17.4
1979	19	0.96	4.29	0.0	5.25
1980	34	0.007	3.20	0.0	3.207
1981	35	0.82	2.91	0.0	3.73

BACTERIAL RING ROT SURVEY

Barbara Mulkewytch
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In 1979, in response to industry request, the Province of New Brunswick introduced legislation known as the Potato Disease Eradication Act. One of the prime thrusts of this legislation was to eradicate bacterial ring rot, a disease which not only restricts our seed export markets but which, if not checked, poses a major threat to our entire potato industry.

You might recall that it was primarily to control ring rot that seed farms such as Bon Accord were established. Graph 1 shows that the level of incidence of ring rot in seed entered for certification has dropped from an average of over 5% to 0.5% in 1976 and has stayed at this low level since then. It took several years for the seed system to be flushed through with good seed since the establishment of the seed farm and the Elite program.

However, despite our efforts to date, a small residual amount of ring rot remains which firstly can always flare up and spread if not controlled and, secondly--and this is the most important part--<u>can</u> be completely eradicated in a short period of time with almost no chance of recurrence if, and only if, we really want to eradicate ring rot and are prepared to take a hard line stance.

The Potato Disease Eradication Act provides the legal authority to take measures to wipe out ring rot.

What are these measures? And how will they work?

Probably the most important item in the Act is the section legislating that anyone growing 1/4 hectare or more of potatoes must plant Certified seed or better. If Certified seed potatoes were 100% ring rot free, this would eradicate the disease. However, in 1981 we still had a small amount of ring rot in our seed potatoes, specifically 0.5% or to put it in more concrete terms, 5 fields or some 55 hectares altogether. It should be pointed out that in all of these ring rot cases there is strong circumstantial evidence that the original source of infection came from outside the Province.

Of 356 ha (879.4 acres) B.R.R. positive
70% trace directly to seed imported from North Dakota in 1978 or 1979.
A further 15% trace to seed lots grown on farms which had other lots planted from North Dakota.

Thus, there is strong evidence to suggest that the ring rot which still remains in our seed lots in N.B. has been imported - some 85% - and this is the most important point, this is then passed around within the Province contaminating other seed lots.

This year, for example, 118.4 acres or 13% of our ring rot positive acreage can be traced back to contamination from <u>one</u> seed grower in the Province who became infected with ring rot from a suspected North Dakota source. This contamination spread unnoticed during the summer of 1980 through several lots, some of which were sold to other growers both in and out of Province. The result:--

118.4 acres ring rot positive in 1981
4 varieties affected
6 N.B. growers affected
and a black mark against our out-of-Province trade.

So how can you protect yourself?

Bon Accord has never had ring rot. The Glassville Seed Potato Production Area hasn't had ring rot since 1965. Many of our seed growers have an equally good ring rot record, therefore, be 99.5% sure,

(1) Buy N.B. seed potatoes - whether you grow for table, processing or especially seed, and
(2) Maintain strick disinfection practices.

I've already pointed out how quickly this disease can spread. Disinfection of equipment between varieties and between seed lots would go a long way towards containing the spread of the disease.

Okay. That's it for the lecture. What are we in N.B. doing about this? How far have we come? In 1979, a ring rot survey was carried out in Carleton County. In 1980 and 1981 a Province-wide survey for B.R.R. was carried out by the Potato Agency and the N.B. Department of Agriculture. The survey involves several components:--

(1) Identify all potato acreages greater than 0.25 ha. This was done from lists supplied by regional District Agriculturists and from Potato Agency records.
(2) Check that all those in (1) had planted Certified seed or better.
Provincial inspectors went to every producer not entered for seed certification and checked to see that all potatoes

planted were of Certified grade or better, as required by the Potato Disease Eradication Act.

In 1980, 85 growers had violated this Act. In 1981, only 15 growers violated the Act. In 1982, we hope to bring this number to zero. We will do this through an advertising campaign in the newspapers like we did last year and in addition, the Department of Agriculture has put together a brochure regarding the Potato Disease Eradication Act which will be distributed to the regional centres. District Agricultural Offices, co-ops, and other retailers.

(3) Inspect fields for B.R.B.

During the month of August, Provincial inspectors checked all table and processing fields for ring rot. Seed inspectors, of course, were responsible for the inspection of seed growers' fields. (Table 1)

(4) Send suspicious samples to lab for diagnosis. Close to 100 samples were submitted to the disease lab for identification. Two confirmatory tests were carried out. In 31 cases both lab tests were positive for ring rot. Thus we had 356 ha ring rot positive which represents 1.7% of our <u>total</u> potato acreage. We're getting very close to eradication. Less than 1/2 of one percent in seed and less than 2% in all potatoes planted.

A word of caution, however! Don't be tempted to blame this last bit of ring rot on growers outside the potato belt (Table 2). 93.5% of the ring rot positive acreage occurred in the major potato producing counties. 90% in Victoria and Madawaska Counties alone. So there's still a job to be done.

(5) Follow up all positives.

Once ring rot has been identified what are the procedures we follow?

The Potato Agency has been given the unenviable task of following up on all cases. The inspector serves the individual with a written order (Appendix 1). Basically, the order stipulates the date by which infected potatoes must be disposed of and all machinery, equipment, storages, etc. must be disinfected. In all cases it would be best to dispose of the potatoes right out of the field but this is not always possible. The grower must also fill out the report from Appendix II so that we can keep track of the disposal and clean up of potatoes throughout the season. It is particularly important that equipment and storages are thoroughly disinfected before new clean seed is allowed on the premises the following spring. Your co-operation with the inspectors cannot be over-stressed.

I would like to point out that we have had excellent co-operation from McCain's in receiving lots infected with ring rot. They have set aside special times for this so as to minimize the danger of contamination for other growers who might be delivering their lots on that day.

Note also that under the Potato Disease Eradication Act:--

> "No producer shall plant potatoes in land on which the presence of B.R.R. has been confirmed until two growing seasons have passed."

This is to eliminate the possibility of field contamination from infected volunteer plants or infected plant debris which has not yet decomposed.

So, what are things to watch for in 1982? A special situation has arisen this year with the variety Bel Rus. We have just received information from scientists in Maine that the Bel Rus variety does not show symptoms of ring rot even if it is infected. This is one of the worst situations possible because if a lot is infected and you don't know it, it is easy to spread ring rot to your other varieties where it will show and cause you losses. If you are growing the Bel Rus variety, take special precautions:

- whenever possible plant Bel Rus last in your planting sequence
- disinfect all equipment, vehicles, etc. after contact with Bel Rus
- store this variety separately and again maintain the strictest disinfection procedures.

This should help protect you from spreading ring rot to your other varieties should it be your misfortune to have a diseased lot. Remember getting ring rot is like getting lice, there is no shame to getting it, just shame in keeping it or spreading it.

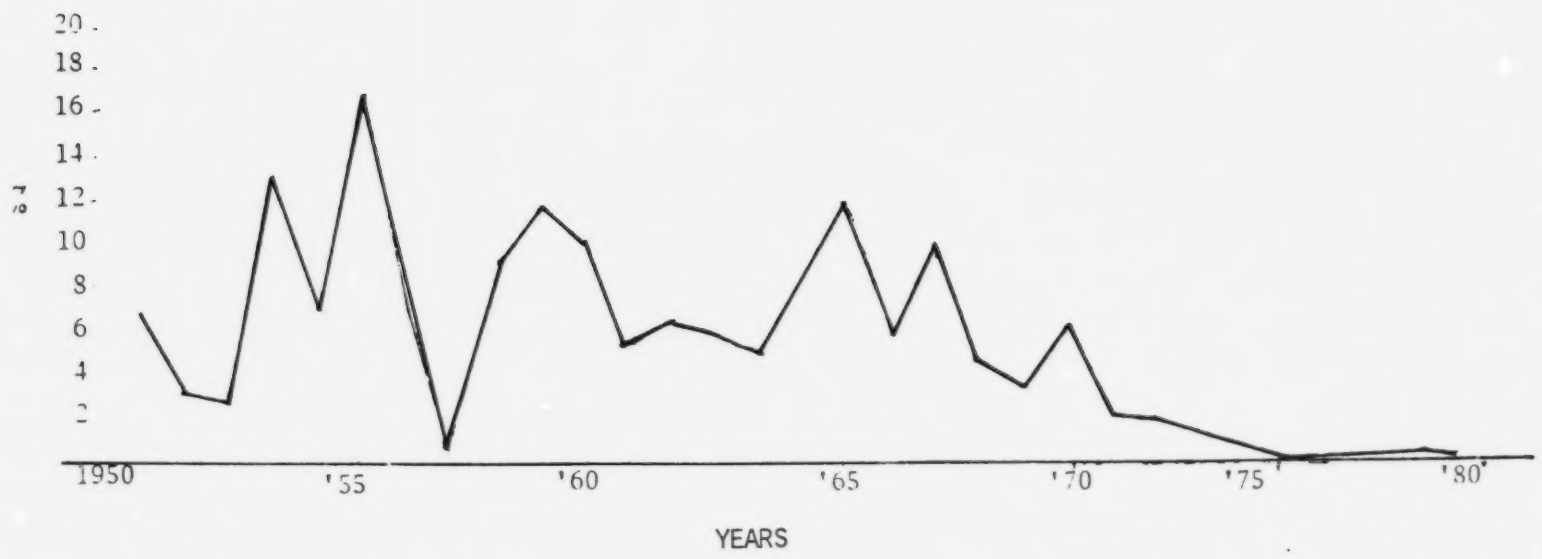
In summary then,

Buy N.B. seed and maintain strict disinfection practices.

GRAPH 1

REJECTIONS FOR B.R.R. IN SEED POTATOES

(EXPRESSED AS % OF SEED ENTERED FOR INSPECTION)



1981 B.R.R. SURVEY - ACREAGE SURVEYED

INSPECTED BY	# HECTARES	# ACRES
N.B. Potato Agency	5,813.2	14,358.6
Canada Agriculture		
- Seed	11,741.9	29,002.5
- Tablestock & Processing	2,998.3	7,406.0
TOTAL	20,553.4	50,767.1
Total # with B.R.R.	356.0	879.4
% with B.R.R.	1.7%	

Table 2.

B.R.R. OCCURRENCE BY COUNTY - 1981

COUNTY	# HECTARES	# ACRES	# GROWERS
Carleton	11	27	2
Victoria	158	389	10
Madawaska	164	405	10
All Others	24	58.5	7

FORM 8

POTATO DISEASE ERADICATION ACT
PROVINCE OF NEW BRUNSWICK

ORDER

To: _____
(name)

Of: _____
(address)

A prescribed disease (bacterial ring rot/potato spindle tuber) has been identified in the potatoes planted on your farm _____

_____.
(location)

Under the provisions of the Potato Disease Eradication Act you are required to:

(1) Dispose of your potatoes by _____.
(date)

(2) The containers and storages which housed the infected potatoes must be disinfected by _____.
(date)

(3) The equipment and vehicles which may have come in contact with the infected potatoes must be disinfected by _____.
(date)

(4) You must file a report (Form 9, attached) with the inspector within 30 days of receipt of this order regarding your plans for disposal and/or disinfection.

If you wish to appeal this Order, you may do so by completing Form 4 (attached) within 5 days of receipt of the Order; and sending it by registered mail or delivering it to:

Chairman, Potato Disease Advisory Board
Potato Production Development Division
N. B. Department of Agriculture & Rural Development
P. O. Box 6000, Fredericton, N. B. E3B 5H1

Failure to comply with this Order will lead to further action as prescribed under Section 19(1) of the Potato Disease Eradication Act.

Issued the _____ day of _____, 19___, at
(month)

_____
(address)

.....
Inspector

.....
Address)

FORM 9

POTATO DISEASE ERADICATION ACT

PROVINCE OF NEW BRUNSWICK

REPORT OF DISINFECTION, DISPOSAL OR TREATMENT

Date Order Issued _____

Date of disinfection, disposal, treatment _____

Method of disinfection, treatment _____
(chemical, steam, etc.)

List containers, vehicles, equipment, places, fields disinfected, treated _____

_____

_____

_____

_____

_____

_____

_____

_____

Quantity disposed _____

Location disposed _____

_____

.....
Name of Producer

.....
Address

POTATO MARKETING STRATEGY

Doug Cressman
Marketing and Development Branch
New Brunswick Department of Agriculture

Most of you are aware, I am sure, of the Commodity Strategies. They were introduced to focus the developmental efforts of the agricultural industry and government under the second Agricultural Sub Agreement. In fact, a number of you will have been directly involved in drafting and annually revising one or more of them. For those of you who have not had any first-hand contact with the Potato Strategy, suffice it to say, that it briefly describes the situation in the industry then lays out the Constraints, Objectives and proposes Actions which should lead to the achievement of these objectives.

The actions that are proposed in the Potato Strategy deal with both potato production development and potato market development. I don't want to give you a long dissertation on the market development initiatives listed in the Strategy. However, I would like to describe to you some of what I consider to be the more interesting activities that have been started this past year and will be continuing.

Our market development efforts have been confined primarily to seed and tablestock and I would like to take this time to talk briefly about both of them.

Looking first at seed, there have been three major initiatives that I believe will lead to a substantial improvement in the industry in the future. The first is the establishment of a Market Development Officer whose attention is directed entirely to seed potatoes. In very general terms his responsibility is to identify opportunities for increased seed sales in both the North American and off-shore markets and to do what is necessary to make sure that our industry takes advantage of them to the greatest extent possible. This includes, of course, a responsibility for identifying any impediments to increased sales within the industry and developing ways to overcome them.

I am sure all of you who produce seed either know or have heard of Dave Thornton. He worked for Ches Smith in Potato Production Development Division for the last four or five years and in that time established a reputation as a hard-working and capable professional. If you have not seen him around quite as much lately, it is because in September he assumed new responsibilities as Seed Potato Market Development Officer. Since then he's been more than busy both within and outside the Province with several of the other initiatives I'll describe.

This is the first time the Department has made a commitment to isolating one staff member's attention on the marketing of seed and I am sure we shall not be long in seeing results.

The second major initiative in seed this past year was the development of the Quality Seed Potato Marketing Program. Everyone in both industry and Government has been concerned that off-shore seed sales have been declining in the recent past and that New Brunswick's share of Canada's off-shore seed sales have shown a consistent downward trend.

To combat this decline, the Minister obtained Cabinet approval for a seed potato market development program. The program is designed to ensure that top quality seed is marketed, that New Brunswick has a greater presence in the market place and that opportunities which are identified are pursued.

The program is made up of two components; a Quality Seed Potato Marketing Program. Everyone in both industry and Government has been concerned that off-shore seed sales have been declining in the recent past and that New Brunswick's share of Canada's off-shore seed sales have shown a consistent downward trend.

To combat this decline, the Minister obtained Cabinet approval for a seed potato market development program. The program is designed to ensure that top quality seed is marketed, that New Brunswick has a greater presence in the market place and that opportunities which are identified are pursued.

The program is made up of two components; a Quality Seed Component and an After-Sales Service component. The Quality Seed component was in place for this year only. Under it, if the higher quality standards that were established were met, if 50% of a given shipment was supplied by growers other than the exporting firm and if both the growers and exporters were in good standing with the Agency then the shipment qualified for assistance at a rate of 50¢ per 50 kilos in some cases and 25¢ per 50 kilos in others.

To February 8th, 439,090 hundred weights have been exported to off-shore markets; 2.7% more than last year at the same time. Of these, 97.0% were shipped under the Quality Seed Potato Marketing Program.

The After-Sales Service Component provides for an Advisory Committee made up of representatives from the exporting firms, the Agency, the N.B. Seed Potato Growers Association and the Department. The Committee's responsibility is to ensure that there is appropriate follow-up on any opportunities identified and that the Minister is advised on the direction the program should take.

In very general terms this Component provides for annual out-going potato missions on the part of the Premier and/or Minister; assistance to exporters to meet shipments upon arrival at destination to verify quality and ensure appropriate handling assistance; to encourage grower to grower contact and the development of seed potato promotional material.

We have started work on the After-Sales Service Component and to date, shipments have been met at destination in 5 off-shore countries to verify their condition upon arrival.

Planning is underway for both the outgoing missions and the grower to grower contact. Some promotional material has been completed; some is in process and some is planned. The Potato Production Development Division in conjunction with the Market Development Branch has completed a slide tape presentation in four (4) languages on Bon Accord and the

production system in the Province. It is intended primarily for visitors to Bon Accord. A 10 minute promotional film on our seed is at the rough cut stage and we should have a finished product within two months. This is designed for use as a sales promotion tool for shippers to use. Funding for a booklet describing our seed production system has been approved and work will soon be underway. It is designed to be a give away that reinforces the points made in the slide-tape presentation and the film.

At this point in time, it's too early to know what impact the program will have. Only next year and in the years that follow will we be able to measure the effect but I'm optimistic. I think we'll see a substantial improvement.

In addition to the Seed Potato Market Development Officer, and the Quality Seed Potato Marketing Program we have committed funds to developing a marketing strategy for our seed in North America. Within the next 6 months we intend to tackle the question of what share of the eastern U.S.A., Ontario and Quebec markets we think New Brunswick seed should have and how can we go about capturing it.

Turning to tablestock, this last year has seen a number of initiatives and as was the case with seed, others are planned.

First, I should mention the Market Development Program we have with the Agency. This year is it's fourth year and I believe you'll have seen evidence of it. Under it, a variety of POS and other promotion material has been developed, two

television commercials have been produced and aired, promotional booths have been entered in shows and inspectors have been hired. This year, the promotion has been limited to airing T.V. commercials within the province, sending a booth to the Royal Agricultural Winter Fair in Toronto and the International Salon d'Agriculture in Montreal and cost sharing a mall display that to date has been in 3 malls in the Province and in the next two months will be in two more.

I believe we're making in-roads with this program but we continue to have problems. First, this year looks like the first year that the budget will be spent. In previous years it was not spent because the Agency could not raise it's share of the costs. Second, it has been very difficult to co-ordinate the promotional efforts we cost share with the growers with the selling efforts of the shippers. In some ways its like having some marketing staff and sales staff report to different managers in a company with no general manager to pull them together. However, as I said I believe we're starting to see light at the end of the tunnel.

This year we became involved with one of the most imaginative and aggressive market development efforts I've seen recently. We are cost sharing with a shipper an effort to quadruple New Brunswick's share of the Toronto table potato market in two years. Early indications are positive but again it's too early to tell. You may or may not be aware that at one time we enjoyed 12% of that market, and in the last five years we've dropped to less than 1% of it so you can see the impact of this project if it's successful.

We've recently established a committee of growers and shippers with the objective of opening a new market in Upper Canada. Our intention is to test a co-operative effort in opening and holding a table potato market. An opportunity has been identified, plans have been developed, and the committee members will be taking their recommendations to their respective organizations for consideration. With any luck the project could be underway within two weeks. If we run into problems it could take up to 6 weeks.

One last initiative I would like to mention is a project that is currently underway. The objective is to develop and set into place a Potato Market Information System. Marketing plans and decisions are only as good as the information on which they are based. In the potato business there are volumes of information available. The problem however is sifting through what's available and picking out what you need to make the decision you have to make. The decision will vary depending on whether you're a producer, a shipper, a processor or a Minister of Agriculture; whether you produce for the table, seed or processing markets.

We set up a Steering Committee which represents the various interests in the industry. This Committee is supervising the work of a consulting firm which has identified the requirements of the different groups who will use it and will be delivering us several options to consider for the system within a month. After a decision has been made on the exact system, work will begin on setting it into place. It's too early to tell yet, but my best guess is that next year at this time the results of the work should be available to you.

In summary, I hope I have given you an idea of the marketing activities that have been going on within the framework of the Potato Strategy. If you have any questions, I'd be more than happy to answer them.

Aside from that I'd like to say that our efforts are aimed at identifying opportunities and trying to provide assistance where necessary to take advantage of them. Most of our efforts have been cost shared with the Federal Government under ASA II, an arrangement that has worked quite effectively. The Agreement is finished in March 1983 so change can be expected. The thing that will remain the same, however, is that government assistance in agricultural market development will be a support to industry. It's the industry that presses the starting button. You people carry the order books and sign the deals. We try to provide any support necessary. Through cooperation we sell potatoes.

TISSUE CULTURE AND THE N.B. POTATO SEED INDUSTRY

Robert Watson
Elite Seed Potato Grower
Grand Falls, New Brunswick

The tissue culture system is primarily a specialized technique within the overall system of potato plant propagation. This system is being proposed for the N.B. Seed Industry and correlates very closely to the tissue culture system in use at the Uihlein Seed Farm in Lake Placid, New York.

Some of the individuals of the N.B. Seed Industry took part in an informative trip to the Uihlein Seed Farm in November 1981, with the objective to view the operations and its methods of potato plant propagation through the use of tissue culture. The understanding of this procedure would allow producers to better relate to the proposed plant propagation system to be implemented in New Brunswick.

The attached flow chart diagramaticly illustrates the method of tissue culture in use. The starting point in the system is a green sprouted disease-free tuber from which a small portion of tissue is removed from the tip of the sprout (excised meristems). The tissue is placed in a test tube or a liquid medium for up to a two-three month period. The growing tissue is then transferred to another test tube with agar medium to grow for a period of two weeks to a month. The test tube plantlet (with small leaves, roots) is then removed from the test tube and segmented so that the upper sections are again transferred to other test tubes. They are allowed to form roots and grow. The basal portion is segmented into four sections and then transferred to other test tubes. In time, these basal sections will be disease-tested for viruses, viroids,

bacteria and fungi. If no disease is detected, plantlets from the upper section of the original plantlet are allowed to grow and they, in turn, can be segmented again to create a greater number of plantlets. These plantlets, when they have grown to the full height of the test tube, can be transferred to vermiculite in styrofoam cups for 8-10 days and then be transferred to large pots in the greenhouse. Tubers are then produced in these pots as Pre-elite material. As a thumb rule, 125 pots would produce 1 acre of EI in two years.

Adaption of Tissue Culture and the Implications for the Seed Industry

1. In comparison to other systems of potato plant propagation, i.e. stem cutting system, the tissue culture system shows a greater rate of plant propagation, and disease control and isolation factors are good. The size and number of tubers produced in this sytem are superior and plant stands in the field resulting from this system are apparently quite even and vigorous.

2. The tissue culture system could bulk up new varieties more quickly than present systems with the appropriate facilities in place. This could allow the industry to be more competitive in out-of-province and export markets, as well as with table potato markets, in that we could potentially develop large marketable volumes of potatoes in shorter periods to meet market demands.

3. The tissue culture system has great implications in potato breeding work.

4. Tissue culture is a very technical procedure requiring laboratory and greenhouse facilities, and this may give governments different roles and responsibilities. This being an intensive concentration on technical aspects of the system and its success rather than operating a total multiplication system, i.e. Elite II classes. This will allot differing responsibilities to Elite and recommended seed growers, particularly with newly released varieties.

5. The potential exists for producers to obtain test tube plantlets and utilize greenhouse facilities to develop more potatoes in the Pre-elite class and thus bulk up varieties to a marketable volume much more quickly. Appropriate technologies must be understood before producers can implement such systems on their own.

Points of Consideration About the Tissue Culture System to be Addressed

1. Initiation of the propagation system - it is understood that plans are underway for the laboratory and the greenhouse to be in place for 1982.

2. Human Resources - appropriate expertise is required to carry out the system with a minimum of problems.

3. Volume of material yielded - will the volume of PE and EI be equal, greater or less than present systems? Other areas tell us this system has superior yields.

4. Research - There needs to be a continual updating of techniques for disease detection, propagation, etc. to keep us competitive.

5. Government funding and financing - will the appropriate funding be in place in the future for implementation of new programs, new techniques, personnel, equipment, or will the cost be the producers'? The provincial, federal governments and producers must consider this area.

6. Consider the overall cost of the continual flow system.

7. Consider the cost of tubers to the producer of Pre elite and Elite I.

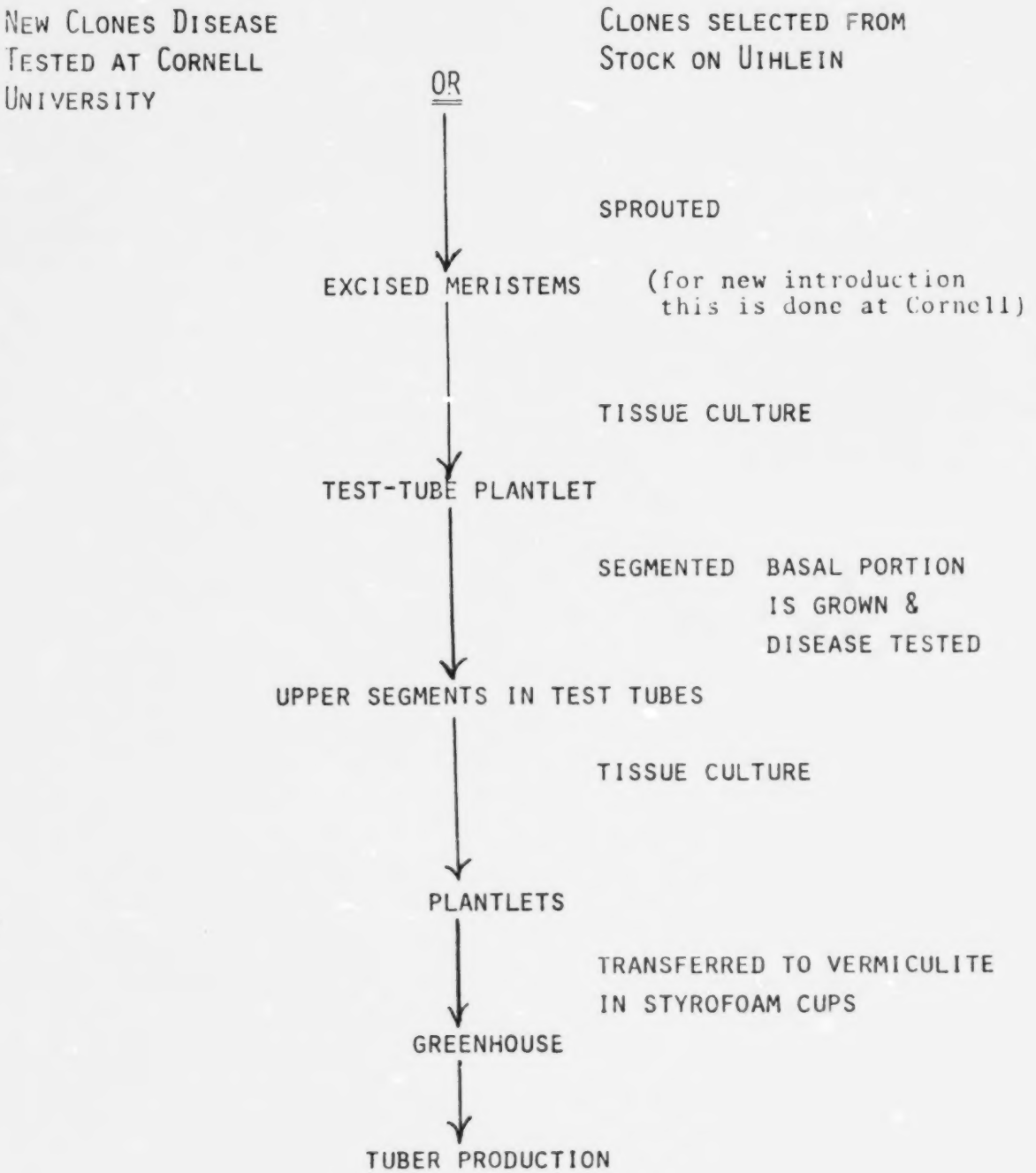
8. Can anything go wrong in the system - flush of infected material which can be offset to a large extent by appropriate expertise, inspection and research.

9. Consider the possibilities of test tube plantlets going out to producers - who is in line to obtain these.

10. RISK considerations - new varieties are bulked up, and existing markets disappear and the producer is at a tremendous loss - this could be addressed by Market RISK programs.

In conclusion, many of the considerations and adaptations to the industry are relative and practical, and hopefully will enable one to more fully understand the propagation system of tissue culture that the N.B. Potato Seed Industry is considering for the 80's.

SYSTEM USED ON UIHLEIN SEED FARM (LAKE PLACID, N.Y.)



USE OF TRUE POTATO SEED

Summary

H. De Jong
Agriculture Canada Research Station, Fredericton

True potato seed (TPS), also known as botanical seed, is the product of fertilization in the potato flower. In nature, insects carry pollen around and are responsible for a large part of natural pollination of potato flowers. Not all potato varieties develop a large amount of berries. This depends, among other things, upon the level of the sexual fertility of the individual varieties. Potato berries usually contain from 25-150 seeds each. These seeds can be extracted from the berries, dried and stored for later use. The seeds are very small and the resulting seedlings are very delicate and vulnerable to extreme environmental conditions such as drought, wind, etc., and attacks by insects and diseases.

The use of TPS was discussed in the following areas:

1. Potato Breeding

   Breeders depend on true seed for genetic variability. Since all plants raised from TPS are genetically different from each other, breeders can select among segregating populations for superior genotypes which, after many years of testing, can be released as new varieties.

2. Home Gardens

Home gardeners are often interested in novelties and since there is very little risk involved for them, some home gardeners like to experiment with new vegetables and/or flowers. TPS has been for sale in Canada at various times for at least 50 years. Open pollinated seed, of which only the female parent is known, is currently sold as F_2 hybrid seed to the home gardening public. Although most viruses are not transmitted through TPS, it is known that the potato spindle tuber viroid can be transmitted this way. At this time there is no government inspection or licensing required of TPS sold in Canada.

3. Developing Countries

The International Potato Center at Lima, Peru has a major thrust in the use of TPS in developing countries. In countries which have a relatively long growing season, high disease pressure, cheap labour and relatively less demanding consumers, the use of TPS may have potential. The methodology for producing potatoes from TPS under such conditions has not yet been fully developed. Plant methods currently under investigation include:

A. Direct seeding
B. Transplants
C. Production of seedling tubers in a nursery for use in the following year(s).

A modification of the third method is currently being used commercially in China. It does not appear that the use of TPS will find application in the commercial production of potatoes in Canada in the immediate future.

MARKET RISK INSURANCE

Elliott Keizer
Executive Director, Marketing Division
N.B. Department of Agriculture

Market Risk

The market risk program for seed potatoes was developed as one part of a five part Seed Potato Quality Improvement Program involving both the Federal and Provincial governments. Under the Market Risk Program a fund is to be established from which seed potato growers will be paid in periods of low prices. Growers would pay 30% of the premiums into the fund, the province 20% and federal government, 50%. The program would be administered by the New Brunswick Potato Agency and the administrative costs would be paid 50/50 by the Provincial and Federal governments.

The payouts from the Market Risk plan would be made when the average price to growers registered with the plan was lower than 75% of a ten-year average price adjusted for inflation. For example, for 1981 the payout would have been anything below $5.80 per cwt.

Earlier this month we were informed that the Federal Government cannot participate in the Market Risk Plan this year. The money is in the Agriculture Canada budget but there is no act which they can spend it under.

The federal Department of Agriculture is preparing legislation to permit them to participate in a special Seed Potato Market Risk Program in New Brunswick on a pilot basis. It is expected that the legislation will be ready for 1983 as the piloting of a bill such as this through Cabinet would take at least a year.

Utilization of Off-Grade Potatoes

The issue of the best use for off-grade potatoes has been discussed for many years. With the recent decision of Piries not to accept whole potatoes at the starch plant this subject is once again under active discussion.

Growers are very interested in off-grade potato disposal because of potential disease problems as well as loss of revenue problems. Packing sheds, of course, need an adequate method to dispose of off-grade potatoes and incoming buyers are very interested, especially seed buyers, in how we handle off-grade potatoes. They are, of course, concerned with the disease hazards.

There are two basic approaches to a problem of this sort; these being marketing or waste disposal. Marketing is the preferred solution because it implies an expansion of the market for New Brunswick potatoes and an increase in returns to growers. Under this heading some concepts which are utilized or which have been discussed include:

a) Feeding more potatoes to livestock. Some feedlots have been approved in recent years for funding under the Agriculture Sub-Agreement to demonstrate the feasibility of use of potatoes in feedlots. A potato - hay silage was also produced with government assistance at one packing plant.

b) The marketing of specialized products such as small and oversize.

c) Alcohol or gasohol.

d) Starch

e) Flakes and granuals. McCains have plants for both of these options.

f) Canned potatoes.

g) Potato flour.

h) Feeding to hogs. Potato peelings from McCains plant is currently being investigated for hog feed.

Under waste disposal the options of both on-farm dumpsites and supervised community sites have been used. Currently the New Brunswick Potato Agency has a proposal in to the Department for dumpsite assistance. The biggest problem with dumpsites is that in the long run there is cost but no returns.

What we need is a system of handling off-grades appropriate for the province. This would probably be made up of a combination of the above possibilities and perhaps others as well. The system must be able to handle surpluses as well as normal levels.

The Department of Agriculture is setting up a task force to look into this issue. The task force will be chaired by Mr. Raymond Scovil the Deputy Minister of Agriculture. The secretary will also be provided by the Department.

Members of the task force will include representatives of several Branches in our Department: ie Potatoes, Marketing,

Livestock and Engineering. Other organizations will also be asked to participate including the New Brunswick Potato Agency, New Brunswick Seed Growers Association, New Brunswick Potato Shippers Association, the Federal Research Station at Fredericton, the Seed Inspection Service, Tablestock Inspection Service, the New Brunswick Department of Commerce and Development, New Brunswick Department of Environment, McCains Company, Pirie Potato Company and quite possibly others.

I hope each of you will cooperate with this task force if you are approached.

Potato Relationship U.S.A. and Maine

There has been a lot of discussion regarding the proposed Maine Seed Inspection law. It appears at the present time the law will not be imposed.

We in Canada should not take this to mean that the Americans have given up their wishes to limit Canadian imports on potatoes. For example, a recent issue of The Packer, January 23, 1982, outlines that New York State as well as Maine are concerned about the import of Canadian fresh produce particularly potatoes. They believe that the Canadian government gives a lot of grower subsidies and propose that subsidies constitute unfair trade practices and violate the General Agreement on Tariffs and Trade (GATT). The potato industry is seeking a countervailing duty to offset the perceived Canadian subsidies.

The National Potato Council of Denver, which has been a successful lobbying group in the past, has recently passed a resolution asking for countervailing duties and anti-dumping regulations by the U.S. Government.

A resolution before the U.S. Senate proposed by Senators Cohen and Mitchell has been referred to the Committee of Finance. This Senate Resolution No. 177 reads in part:

> "Resolved, That it is the sense of the Senate that the President should, and is hereby urged and requested to, negotiate with representatives of the Canadian Government in an effort to obtain an agreement limiting the export from Canada to the United States of both seed and tablestock potatoes and to issue regulations under section 204 of the Agricultural Act of 1956 governing the entry or withdrawal from warehouse of such commodities to carry out any such agreement."

A similar House Resolution No. 186 has been referred to the Committee on Ways and Means.

There is also Senate Bill 11 which if enacted would immediately become law. This bill has been read twice and referred to the Committee on Finance. It reads:

> "Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled that the Secretary of the Treasury or his delegates shall not process potatoes for entry into the United States until the President determines that the Department of the Treasury, the Department of Agriculture and other Federal agencies have taken appropriate measures to ensure that potatoes imported as seed stock are not substituted for potatoes intended for human consumption."

This Bill if passed would prohibit entry of potatoes into the United States until the government had worked out a suitable system of ensuring that seed potatoes did not make their way to the tablestock market.

I am not suggesting that these bills will pass simply as proposed, but we must remember that a lot of work is going on in the United States to have this type of action taken by the U.S. Government.

Movement of Potatoes

Up to and including February 16, 1982, New Brunswick's movements were 11.3% over 1981 and 14% over 1980. P.E.I. similarly was 1.8% over 1981 and 15% over 1980.

Published statistics show US holdings as of February 1, 1982, at 9% above 1981 and 10% below 1980. Canadian holdings at the same time were 13.5% above 1981 and 3% above 1980.

RESULTS OF 1981 GRAIN TRIALS

Clinton McLean
Field Crops Specialist
N.B. Department of Agriculture

It is a pleasure to have the opportunity to discuss with you today, the results of the 1981 Adaptive Research Trials conducted by the Plant Industry Branch. Since time is limited, my remarks will concentrate on those trials which appear to be of most interest to you as potato producers.

The main thrust of our trials in this region involves those crops which are grown in rotation with potatoes; the major one being grain. Total grain production in New Brunswick in 1981 was approximately 78,000 acres. Regardless of this, grain production in New Brunswick is still looked upon largely as a "necessary evil", merely serving as a rotational crop until potatoes are grown again. I do not believe that any amount of discussion of the benefits of crop rotation will serve to boost the grain industry in New Brunswick. What you as a farmer are interested in is the dollar value of that crop in your operation. Therefore, I feel that the best way to promote rotational crops is to make these crops more profitable. With this in mind, I will summarize the results of trials conducted to achieve this goal.

Much of our work over the past four years has involved intensive grain management. Although relatively new to this area, this sytem has been practiced in Europe for many years. The componenets of the intensive management system are higher levels of fertility, including split nitrogen applications; use of growth regulators to control lodging, and use of fungicides to control disease.

Table 1 shows the yields of the various treatments. No increase in yield was obtained with the use of Bravo as a fungicide in 1981. Treatment 1, receiving 400 Kg/ha of 15-15-15 is not significantly higher than those treatments receiving nitrogen only. This is in line with results of the past three years, indicating that there is no economic advantage in adding phosphorus and potash when growing wheat on high fertility soils following potatoes.

Table 2 gives protein percentages of the various treatments. The highest protein content was obtained with a split application of nitrogen. The data also shows that 15-15-15 at time of seeding did not give significantly higher protein than no fertilizer.

Table 3 presents the disease ratings on Bravo treatments and controls. The data show that septoria was reduced in the highly fertilized plots. Yield and protein content were not increased by Bravo in 1981, however, under more severe disease conditions this may not be the case.

Results of the cereal seed treatment evaluation are presented in Table 4. Increased yields were obtained with CGA64251 and Vitaflo 250. For unknown reasons, Vitaflo 280 did not give a yield increase in this trial, however, in other trials it has proven superior to Vitaflo 250.

The growth regulator Ethrel (ethephon) was evaluated under N.B. conditions for the first time in 1981. Yield data are presented in Table 5. Overall plant height was reduced by 20%. The length of the peduncle (the part of the plant from the top node to the head) was reduced by 50%. In addition, neck breakage was reduced. Although there was no significant difference in yield, harvestable yield may be increased, due to decreased lodging and neck breakage. Response may vary greatly among varieties.

Tables 6 and 7 present yields of the barley and wheat variety trials, respectively. When reviewing these data, one must remember that they are the results of one year's evaluation only, so any conclusions are preliminary. Other factors must also be considered; such as lodging resistance, neck breakage, ease of harvesting, maturity and disease resistance.

Trials are also being currently conducted to evaluate the potential of winter cereals in New Brunswick. Several potential advantages exist, such as greater yield potential, erosion protection, improved soil structure, competition with weeds, timeliness of operations, and the potential of high yielding, milling quality grain.

The data presented in Table 8 shows the yields of seven wheat, two rye, and one triticale cultivars evaluated in the 1980-81 season, sown on three different planting dates. The highest yields were obtained with the earlier planting date; except in the case of Frederick and Lennox, where lodging was more severe in the August 27 planting.

Another project involving winter cereals was initiated to assess the value of winter rye as a cover crop in reducing soil erosion. The data are summarized in Table 9. Plant counts were determined on October 28. Part of the field was seeded on September 8, at two seeding rates, before potatoes were harvested on September 18. Another part of the field was seeded on September 18, just prior to digging. The remaining third was planted on September 18, after the potatoes were dug. The best ground cover was obtained at both seeding rates, when seed was broadcast just prior to potato harvest, allowing for some coverage of the seed during the digging operation.

Another project was established to evaluate various crop rotations in the potato production system. One farmer said he felt the best rotational crop for potatoes would be Christmas trees. However this one was not included. Table 10 shows the various rotations involved. Data will be collected on crop yields, economics of each rotation over a three-year period, as well as effects on potato quality, soil properties, and erosion.

Another crop which was looked at was buckwheat. Yield results from seven fertility levels are shown in Table 11. No significant increase was obtained with any of the fertilizer treatments. Low yields were obtained in all cases, partly due to a large number of unfilled kernels blown out during cleaning.

Two trials were carried out with soybeans. Results of the variety evaluation are shown in Table 12. The McCall variety gave the highest yield in both the Florenceville and Sussex locations.

Table 13 shows yields of the Maple Presto variety in an inoculant evaluation. Granular inoculant gave the highest yields and is recommended when soybeans are grown for the first time in a field. Powdered inoculant gave lower yields, however, they were still in line with those obtained from applying 80 kg/ha of urea, which shows that it did cause nodulation and the fixing of nitrogen.

For those wishing more information on these or other trials conducted, full reports are found in the Plant Industry Branch 1981 Adaption Research Reports, which is available upon request.

TABLE 1

INTENSIVE GRAIN MANAGEMENT - YIELD

PLOT No.	NITROGEN Kg/Ha Gs.1	Gs.5	Gs.10	YIELD D.M. Kg/Ha	Bu/Ac
1	400Kg/ha	15-15-15		2940	43.6
1B*	400Kg/Ha	15-15-15		3131	46.4
2	40	40	40	3225	47.8
2B	40	40	40	3430	50.9
3	40	40	0	3244	48.1
3B	40	40	0	3154	46.9
4	40	0	0	3143	36.6
4B	40	0	0	3152	46.7
5	80	0	0	3088	45.8
5B	80	0	0	3109	46.1
6	120	0	0	3185	47.2
6B	120	0	0	2515	37.3
7	0	0	0	2381	35.3
7B	0	0	0	2456	36.4
- L.S.D. 5%	Fertility			293.9	
	Fungicide			N.S.	

*B - Bravo

TABLE 2

INTENSIVE GRAIN MANAGEMENT - PROTEIN %

PLOT No	NITROGEN Kg/Ha GS.1	GS.5	GS.10	PROTEIN %	PROTEIN Kg/Ha
1	400Kg/Ha 15-15-15			12.7	373
1B*	400Kg/Ha 15-15-15			13.1	410
2	40	40	40	15.4	497
2B	40	40	40	16.1	552
3	40	40	0	14.8	480
3B	40	40	0	14.9	470
4	40	0	0	13.0	409
4B	40	0	0	12.7	400
5	80	0	0	14.0	432
5B	80	0	0	14.0	435
6	120	0	0	14.7	468
6E	120	0	0	15.0	377
7	0	0	0	13.1	312
7B	0	0	0	12.7	312

- L.S.D. 5% Fertility .58
Fungicide N.S.

*B - Bravo

TABLE 3

INTENSIVE GRAIN MANAGEMENT - DISEASE %

PLOT No	NITROGEN Kg/Ha Gs.1	Gs.5	Gs.10	SEPTORIA % Leaf	Glume
1	400Kg/Ha 15-15-15			65.3	16.0
1B*	400Kg/Ha 15-15-15			34.6	9.3
2	40	40	40	50.6	12.3
2B	40	40	40	11.6	8.0
3	40	40	40	55.6	12.0
3B	40	40	0	29.6	9.3
4	40	0	0	48.3	9.6
4B	40	0	0	42.3	10.0
5	80	0	0	69.6	16.0
5B	80	0	0	40.0	8.6
6	120	0	0	65.0	12.3
6B	120	0	0	26.0	11.3
7	0	0	0	43.3	14.3
7B	0	0	0	44.0	15.0
- L.S.D. 5%	Fertility			N.S.	N.S.
	Fungicide			11.0	1.8

*B - Bravo

TABLE 4

CEREAL SEED TREATMENT EVALUATION

SEED TREATMENT	YIELD D.M.* Kg/Ha	Bu/Ac
NONE	2483A	36.8
VITAFLO 280	2502AB	37.1
BAYTAN	2776ABC	41.2
VITAFLO 250	2806BC	41.6
CGA 64251	2993C	44.4

*Means followed by same letters are not significantly different.

TABLE 5

GROWTH REGULATOR ON PERTH BARLEY

TREATMENT	YIELD	
	Kg/Ha	Bu/Acre
Ethrel	3871	71.7
Check	3925	72.7

TABLE 6

BARLEY VARIETY TRIAL

VARIETY	YIELD KG/HA	BU/ACRE
ATLANTA	3532 B	65.5
KEYSTONE	3426 B	63.5
BONANZA	3374 B	62.5
VOLLA	3359 B	62.3
BRUCE	3231 AB	59.9
KINKORA	3206 AB	59.4
LAURIER	3161 AB	58.6
SUMMIT	3100 AB	57.5
LOYOLA	2896 A	53.7
PERTH	2820 A	52.3

TABLE 7

WHEAT VARIETY TRIALS

VARIETY	YIELDS* KG HA	BU ACRE
CONCORDE	3173 C	47.1
DUNDAS	3143 BC	46.1
OPAL	3038 BC	45.1
VERNON	2933 B	43.5
GLENLEA	2841 AB	42.1
NEEPAWA	2674 A	39.7

* Means followed by same letters are not significantly different

TABLE 8

YIELD OF WINTER CEREAL VARIETIES 1981

VARIETY		YIELD VS SEEDING DATE KG/HA (BU/AC)		
		AU. 27	SEPT.9	SEPT.19
WHEAT:	VUKA	6160(92)	5620(84)	4060(60)
	CLEMENT	6020(90)	5320(79)	3790(56)
	MONOPOL	5790(86)	5430(81)	3770(56)
	KOOMARAN	5560(83)	4680(70)	3500(52)
	FREDERICK	4280(64)	5090(76)	4530(67)
	LENNOX	3560(59)	5210(77)	4340(65)
	NORSTAR	-	3260(48)	3450(65)
RYE:	ANIMO	-	5380(86)	5390(86)
	KUSTRO	-	4520(72)	3980(63)
TRITICALE:	WINTRI	-	3920(60)	-

TABLE 9

WINTER RYE AS A COVER CROP

SEEDING RATE	*PLANT POPULATION PER M2		
		BEFORE HARVEST	AFTER HARVEST
Kg/Ha	SEPT. 8	SEPT. 18	SEPT. 18
200	65	131	83
125	55	94	55

* Recorded October 28

TABLE 10

CROP ROTATION PROJECT 1980-1983

PLOT NO	1980	1981	1982	1983
1	POTATO	POTATO	POTATO	POTATO
2	POTATO	WHEAT	WHEAT	POTATO
3	POTATO	BUCKWHEAT	POTATO	POTATO
4	POTATO	WHEAT-CLOVER	CLOVER	POTATO
5	POTATO	PROSS.-PEAS	WINTER WHEAT	POTATO

TABLE 11

"BUCKWHEAT FERTILITY EVALUATION"

RESULTS

FERTILIZER TREATMENT	YIELD Kg/Ha	PLANT HEIGHT CM
0-0-0	449	45
10-0-0	448	43
20-0-0	545	45
10-20-20	488	48
20-20-20	545	47
20-40-40	597	47
30-30-30	544	45
MEAN	517	45.7
	N.S.	N.S.

TABLE 12

SOYBEAN VARIETY EVALUATION

VARIETY	YIELD D.M. Kg/Ha (Bu/Acre)		
	FLORENCEVILLE	SUSSEX	AVERAGE
MAPLE PRESTO	1254 (18.6)	993 (14.7)	1124 (16.7)
MAPLE ARROW	1456 (21.6)	1629 (24.2)	1542 (22.9)
McCALL	1744 (25.9)	2050 (30.4)	1897 (28.1)

TABLE 13

SOYBEAN INOCULANT EVALUATION

TREATMENT	YIELD D.M. Kg/Ha	YIELD D.M. Bu/Acre
UREA	688A	10.2
GRANULAR	985B	14.6
POWDER	652A	9.7

METHODS TO REDUCE PESTICIDE COSTS AND REDUCE DRIFT FROM TARGET AREAS

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Good seed selection is the key to disease and insect control in potato production. Growers should put any extra money in the seed purchased. There are five key steps in potato seed selection. These are:

1. Know your seed producer.
2. If possible, visit the field where the seed is being grown and the storage where it is kept.
3. Obtain a 200-tuber sample for further observation prior to finalizing the sale.
4. Know the Florida test results.
5. Ask for an inspection.

Wash and observe a 200-tuber sample from each seed lot that you intend to buy or plant. Observe the sample for late blight, Rhizoctonia, Silver Scurf, Scab, Fusarium, and physiological problems. The following are suggested tolerance levels for various diseases on seed potatoes intended for planting.

Tolerance Levels for Seed

A. Rhizoctonia - less than 10% of the surface with sclerotia, russeting, or cracking. If more than this is present, a seed treatment is recommended.

B. Fusarium - less than 0.5% of the sample showing symptoms. Cut 20 tubers in half and place in a plastic bag. Rotate so the cut surfaces come in contact with the skins on other seed pieces. Then place the seed pieces in a clean paper bag and store for 10-14 days at 60°F and 85% or higher relative humidity. If you find more than two lesions/cut surface, a seed treatment is needed.

C. Silver Scurf - If 10% of the tuber surface is affected, do not use. A seed treatment is recommended if the disease is present.

D. Black Leg - Do not use if more than 1% of the tubers are infected. Pinkeye - Do not use if observed.

E. Early and Late Blight - If tubers have lesions, do not use these lots for seed if possible.

Many seed-borne diseases are also soil-borne. Therefore, one needs to have two methods of control - rotation and seed treatment. Seed and soil-borne diseases include: Rhizoctonia, Fusarium, Silver Scurf, Black Leg, Pinkeye, Early and Late Blight, Scab, and Verticillium Wilt. In order to help reduce seed-piece decay problems, the planting of B's or blocky seed pieces (1.5-2.5 ounces) is recommended. Bigger seed pieces stand up under adverse weather conditions. They are more apt to yield a healthy productive plant. Remember that eye number on seed pieces is important because eye number determines the number of stalks/hill which determines the number of tubers set. Single stalk hills often tend to produce oversized tubers.

Control of Seed and Soil-borne Diseases

Seed Treatments: To insure protection against diseases, it is recommended to treat all seed prior to cutting. The seed treatment helps reduce the possibility of reinfesting the soil.

Crop Rotations

1. Follow the best rotation possible for your farm operation.
2. Crop rotation is necessary from a disease point of view for Rhizoctonia, Verticillium, Fusarium, Silver Scurf, Scab, and Ring Rot.
3. Avoid heavy clover on fields with Scab or Verticillium problems.
4. Use green manure to reduce soil-borne disease problems. Millet is an excellent green manure.

The potato integrated pest management program has surveyed plant stands for several years.

Potato Plant Stands

1. In 1979 - Plant Stands - 61%
2. In 1980 - Plant Stands - 70%
3. In 1981 - Plant Stands - 68%

There are many reasons for these poor stands including poor seed cutting practices, improper planter adjustments and speed, and various disease and seed-piece decay problems. One cause is due to sprout nipping by Rhizoctonia.

Rhizoctonia is a fungal disease of potatoes caused by Rhizoctonia solani. This fungus can attack potatoes at various sites and stages of growth. It can reduce stands by causing a sprout nipping. This nipping delays plant emergence, weakens any plants that do eventually come up, or simply exhausts the seed piece's energy resulting in formation of tubers on the end of the sprout. Rhizoctonia is also responsible for the "black scurf" stage which is a cosmetic problem on tubers entering the fresh market. These black scurf are the major source of fungus for the sprout nipping stage. Rhizoctonia also reduces the percentage of #1 potatoes produced by a plant and results in russeting, scabbing, and "growth cracks" on misshapen tubers.

Vine burning is one means of reducing the amount of over-wintering inoculum for Rhizoctonia. It also helps reduce the inoculum level of Early Blight, Verticillium, and corn borers where they are a problem.

The Maine Aphid Alert Program is part of the overall integrated pest management program on potatoes. In any scouting program for potato pests, sampling techniques need to be developed.

Sampling Techniques for Field Scouting

1. Pick high risk areas. A field's past history of pests or diseases will be useful. Risk areas vary with the pest or disease involved.
2. Observations and counts should be made weekly beginning when plants are 4" tall.

For aphids, counts are made on 50-100 plants scattered randomly within a one-half acre block. One bottom, middle, and top leaf/plant is examined and species and numbers are noted. Field counts are used to determine aphid population buildups, possible resistance to insecticides, efficacy of soil applied systemic insecticides, and when aphid wing pad formation is underway. Most virus spread is by winged aphids; and by timing foliar insecticide sprays to control the nonwinged forms at the time of wing pad formation, more efficient use of insecticides can be achieved.

Migrations of winged aphids are measured in yellow pans. These pan catches inform us of the timing of aphid flights and correlation of pan counts to eventual Florida test results. In many areas, potato vine killing is timed with the arrival of the fall migration of Green Peach Aphids.

Decisions on Systemic Insecticides

1. There is no easy answer.
2. It is better to plant good seed than to buy good insecticides.
3. Systemic insecticides help delay aphid population buildups.
4. Systemics to be effective should be used in a seed-area concept.

Use of Systemic Insecticides

Advantages

1. Prevents early nonwinged aphid buildups.
2. When used over wide areas, it helps reduce aphid-borne virus spread. Especially - leafroll.

3. Reduces the need for an early season foliar spray.
4. Delays fall aphid migrations if used over large areas.

Use of Systemic Insecticides

Disadvantages

1. Use of a systemic does not guarantee virus-free seed. Virus problems are the result of the seed planted in an area.
2. No corn borer control.
3. Only Temik gives any beetle control.
4. Systemic insecticides are worn off by late season when the green peach aphid population is the highest. Temik lasts about 85 days; Disyston lasts about 75 days - this varies with weather and soil conditions.
5. A systemic will not kill migrating aphids fast enough to prevent virus spread especially with mosaic viruses.

Elimination of Systemic Insecticides Requires Field Scouting

1. Good or bad? Depends upon your point of view and whether you are willing to monitor aphid populations.
2. Must control aphids:
   a. Spray at or before aphid wing pad formation.
   b. Can allow different aphid levels depending upon the crops intended use (seed, table, processing) and variety.
   c. Try to kill the best seed plots before major fall aphid migrations.

Aphid Facts

1. Green Peach Aphids are the best vector of leafroll and mosaic viruses.
2. No insecticide will kill virus carrying aphids fast enough to prevent spread.
3. Aphids form wing pads when they become crowded.

Virus spread is dependent upon the number of aphids carrying virus; the number carrying virus is dependent upon the virus content in the seed planted.

Strategy on Planting Site Selection and Use of Systemic Insecticides

1. Locate your best seed plots on hilltops. Stay away from wind sheltered areas where aphid collect.
2. Use barrier crops (small grains, resistant potato varieties) to reduce spread.
3. The greatest benefit of systemic insecticides is on the worst fields. (Those with the highest virus levels.)

Recommendations for Seed Area Aphid Control

1. Use systemic insecticides for entire area.
2. Apply a foliar insecticide anytime 10% of the potato plants sampled have aphids or aphids with wing pads are found.

Non-Seed Area Aphid Control Recommendations

1. Areas with few aphids:
   a. Use a foliar insecticide when there are 10 aphids/plant based on a 100/plant sample.
   b. After second week of bloom, use a foliar when there are 25 aphids/plant/100 plants.

   SPRAY ANYTIME when aphids with wing pads are present.

2. Areas with many aphids:
   a. Use foliar insecticides when 10 aphids/plant/100 plants.

   SPRAY ANYTIME when aphids with wing pads are present.

Leafroll is an aphid transmitted virus which can cause serious economic losses. Leafroll is transmitted by infected seed potatoes in a persistent manner primarily (90%) by the Green Peach Aphid. Net necrosis is a serious problem in susceptible potato varieties and is primarily the result of current season virus infection. Control measures recommended for leafroll include:

1. Use of disease free seed.
2. Isolate seed plots from aphid populations.
3. Rogue diseased plants.
4. Use systemic insecticides and late season foliar sprays.
5. Harvest seed plots early.

Mosaic viruses are another group of seed and aphid transmitted diseases which can cause serious losses. These viruses are transmitted in a nonpersistent manner by many different aphid species. The Green Peach Aphid is the most efficient vector. Mosaic viruses unlike leafroll can also be transmitted mechanically. An aphid can feed on an infected plant and transmit mosaic virus in the period of a few seconds. This makes control more difficult since insecticides will not kill incoming aphids fast enough to prevent virus spread. Control recommendations for mosaic viruses include:

1. Use disease free seed potatoes.
2. Use systemic insecticides and late season foliar sprays.
3. Rogue diseased plants.
4. Isolate seed plots from areas where aphids tend to congregate.
5. Use barrier crops to help reduce the number of aphids carrying virus into the fields.

European corn borer has become a problem in Aroostook County. In Aroostook County, we experience one generation a year with egg laying occurring sometime in July. The tiny larva hatch and within 2-3 days bore into potato stalks to complete their growth. Stalk boring decreases potato yields by reducing the flow of water and nutrients within the plant. The holes made by the larva also provide an opening for stalk rot bacteria which then may cause plant death. The larvae are protected from chemical control once they bore into the stalk. Eggs are laid nightly by the adult female moth over a period of 2-3 weeks. Egg masses usually (15-30 eggs) look very much like

fish scales. The eggs are resistant to many of the insecticides available for use. Since the egg masses are laid on the underside of leaves, contact with an ovicidal insecticide is difficult. The adults are presently monitored by black light traps.

A warning is issued when 30 corn borer moths are trapped at one site over a 5-day period. We are presently correlating growing degree days with adult moth emergence and egg laying in hopes of being able to issue a warning about the time to begin scouting fields for adult moths and egg masses. Growers may also want to store some larva infested vines along the edge of a field to observe larval overwintering, pupal development, and adult emergence in order to time scouting activities in their area.

Another insect problem is the potato flea beetle - Epitrix cucumeris. The flea beetle is a small, shiny, black bug with enlarged hind legs. They feed on various plants producing a shot-hole pattern in the leaves. On potatoes, the young plants are most susceptible. In low flea beetle areas, an insecticide is usually not needed. In high flea beetle areas, a spray recommendation is made when 15 feeding holes/terminal leaflet are found on 25 plants scattered randomly throughout the scouting area.

Colorado Potato Beetles (Leptinotarsa decemineata) are becoming more of a problem in Maine. Resistance to many commonly used insecticides exists in southern Maine. The young larva are easier to control than later stages. Control of over-wintering adult and first generation larvae will reduce the population for the rest of the season. Spot treatment of infested areas can reduce overall costs.

Colorado Beetle Controls

1. Regions with few beetles
   a. First year potato fields - before plants are 6" tall, use a foliar when 5 adults/50 feet of row are found.

      After plants are 6" tall, use a foliar insecticides when 2 larvae or adult beetles/plant/50 feet of row are found.

   b. Second year or longer potato fields - spray when 2 larvae or adult beetles/plant/50 feet of row are found.

2. Regions with many beetles

   a. Apply a systemic insecticide to the soil and use a foliar when 2 larvae or adult beetles/plant/50 feet of row occur.

Late Blight is a fungal disease caused by Phytophora infestans. It is probably the most serious disease of potatoes in Maine. Leaf and stalk infections can result in complete loss of an infected field. The late blight forecasting program makes use of weather data to determine the potential for late blight spread. This program is useful in helping to initiate the seasons used. It cannot take into account the presence of late blight inoculum so the grower must be aware of potential nearby infections. The severity of late blight the previous year and the size and number of cull piles that spring help to determine the potential for infection from seed, volunteers, or culls.

Early Blight (Alternaria solani) is another fungal problem which appears to be on the increase in Maine. The use of rotations to reduce the overwintering inoculum in vines would greatly reduce this disease problem. Early blight lesions characteristically have a target or "bulls eye" pattern and are often found on the lower leaves of potato plants.

Presently labeled fungicides are protective in nature only. They will not cure blight. Timing of application is one of the most critical areas a grower needs to pay attention to. Many growers do not begin their spray program soon enough and early blight becomes established. Growers should use shorter spray intervals during periods of rapid plant growth. Susceptible varieties (Superiors) should be sprayed extra early, probably by the time the plants are 4" tall. Blitecast should be used to time sprays.

Pesticide drift is everyone's concern. Drift reduction consists of minimizing particle movement away from the target area. Can drift be eliminated?

No! It can only be reduced to more acceptable levels. The worst problem is the non-visible fines. University tests show that increasing the nozzle size while maintaining the same pressure reduces drift by 29%. When the spray volume output is adjusted to be equal by reducing the pressure, actual drift reduction is even greater.

Sprayer calibration is one of the most important functions in using pesticides safely. The rate of application is governed by speed, pressure, nozzle size and number. In order to maintain uniform coverage, these four factors must be kept constant. The spray volume can be increased by increasing pressure or reduced by decreasing pressure only to a limited extent. An increase in pressure does not give the uniform or expected increase in gallons/acre. To double sprayer output, the pressure would have to be increased four times.

Nozzles are the most critical part of a sprayer - not just because they dispense pesticide but because they affect the sprayer output more than any other factor. A change in nozzle size is the most important way to change the rate of application. (TABLE 1) Speed and pressure should be used to make only minor changes in the gallons output of a sprayer. A substantial increase in pressure may change the spray pattern and decrease spray droplet size, therefore, increasing the likelihood of drift.

TABLE 1 DISCHARGE CAPACITY OF TEE JET SPRAY NOZZLES WITH DISC-TYPE, HOLLOW-CONE SPRAY PATTERN

DISC NUMBER	CORE NUMBER	CAPACITY IN GALLONS PER MINUTE AT PRESSURES OF: 100 PSI	150 PSI	175 PSI	200 PSI
	13	.12	.14	---	.16
D2	23	.16	.19	---	.21
	25	.25	.29	.32	.34
	45				

DISC NUMBER	CORE NUMBER	CAPACITY IN GALLONS PER MINUTE AT PRESSURES OF: 100 PSI	150 PSI	175 PSI	200 PSI
	13	.13	.16	---	.18
D3	23	.18	.21	---	.24
	25	.29	.35	.37	.40
	45				
	13	.17	.20	---	.28
D4	23	.23	.28	---	.32
	25	.45	.54	.58	.62
	45				
	13	---	---	---	---
D5	23	.28	.34	---	.38
	25	.54	.65	.70	.75
	45				
	13	---	---	---	---
D6	23	.32	.39	---	.45
	25	.70	.85	.91	.9
	45				

The greater the nozzle overlap on a boom the less likely that skips will occur when the boom bounces. This is a point to consider with all the rolling terrain that we farm. (TABLE 2).

TABLE 2 RECOMMENDATIONS* FOR DISC NOZZLE SPACING AND HEIGHT ABOVE POTATO VINES

DISC SIZE	SPACING	HEIGHT ABOVE PLANTS
D2**	20"	11" - 19"
D3**	20"	11" - 19"
D2**	9"	5.5" - 9.5"
D3**	9"	5.5" - 9.5"

*Personal communications - John Coulston, Engineer, Spray Systems, Wheaton, IL.

**With Either a 25 or 45 core.

Any nozzle more than the recommended height above the vines causes a loss in product effectiveness.

One method of reducing drift is the addition of anti-drift agents to the sprayer. One such agent resulted in 30% more pesticides being deposited in the target area than when it was not used. Presently, these anti-drift agents can be used with herbicides but are not compatible with fungicides.

Remember, the best way to make major changes in the gallonage output of a sprayer is to change nozzle tips and not the pressure or speed. In order to double the gallonage output of a sprayer, it takes an increase in pressure of four times. This results in a drastic increase in the number of fines and pesticide drift. A flat fan nozzle and a boom pressure of 60-80 psi is recommended for herbicide applications. A hollow cone nozzle and a pressure of 100-150 psi is recommended for fungicide applications. The gallons/acre sprayed should be increased as the potato vines increase in size, especially if late blight favorable weather is occurred.

Sound practices and common sense can go a long way towards helping us to reduce pesticide drift.

COPING WITH INTEREST RATES

Bill Musto
Manager, Agriculture
Bank of Montreal, Halifax

Thank you ladies and gentlemen for the opportunity to speak with you today.

With the current level of inflation and the associated high interest rates, businessmen, and I include farmers in that category, are being forced to maintain a high level of management and be constantly aware of where they and their business are both physically and financially. Strong and imaginative management can cope in the short term with inflation and high interest rates. As evidence, one need only look at Israel. There the inflation rate has been approximately 135% and farmers have been paying approximately 90% on their operating loans. However, I must emphasize the short term. If we are able to take control of our economy and business now, hopefully we can avoid those kind of rates here in North America.

Perhaps we are in this situation today due to our ever increasing expectations. We have grown up to expect that things will always get better. Our incomes will continue to rise and we spend accordingly. And when our incomes don't rise to meet our expectations, we turn to our governments to take care of us. However, that becomes very expensive. The governments are also guilty of these expectations and as a result, we end up with deficit financing which then becomes a significant contributor to the inflation and interest rate spiral.

During my university career, and to some extent during my career with both the Federal and Provincial governments, we were told and were guilty of passing the information along to our clients to borrow as much as one can now and pay it off in the future with inflated dollars. We assisted farmers in applications to credit agencies, both governmental and private, to borrow ever increasing amounts of money to solve problems. We did this even when we knew deep down that the individual's management abilities and cash flow were suspect. Too often we assisted the farmer to go down with the ship. Perhaps in the future, our emphasis as extension people will be to not only help those individuals that can afford it to borrow, but to assist farmers in getting out of the business while he still had some equity left. To assist that individual to recognize when it is time to call it quits. In other words, beware the tide of rising expectations and recognize the realities of today's situation.

With that in mind, I would not like to address the steps that should be considered in developing and presenting a credit proposal.

Farm captial requirements in the Atlantic Provinces are increasing at a rapid rate. Like other areas in Canada, inflation is escalating the price of real estate, livestock and equipment. More money is also required for feed, fertilizer, supplies and operating expenses. Credit, a management tool of doing business for many years, is becoming a necessary component of proper farm business management. It takes money to make money and credit is a productive tool that will increase the returns of an expanding and developing farm business.

In discussing the process of preparing and presenting a credit proposal, one must never lose sight of the fact that it is a measurement of one's management ability. How one goes about presenting a credit proposal tells the lender in many ways what kind of a manager he or she is. It is a management job and if one is not willing to do it properly, then the chances of using or indeed obtaining credit successfully are substantially reduced.

Most articles on credit from the borrower's point of view talk about the 3 R's of credit: returns, risks and repayment. However, in my opinion, two other components of a credit proposal are often overlooked. These are the goals or objectives of the farmer - in other words, how does this particular credit proposal fit in a good sound long range management plan - the other is markets. There is no success in being able to grow or produce a fine product if nobody wants to buy it or if transporation problems prevent moving the product to a prospective buyer, or if surplus production depresses prices below your cost of production.

It is understood that there are differences depending upon whether it is a first time application, a major expansion or a continuation of a long and trusted credit relationship between bankers and established farmer. However, similarities remain in that the returns, risk and repayment questions all have to be answered.

Returns

Remember, you have to market your idea or proposal to a lender who cannot possibly lend money to whomever wants it.

You must convince yourself and the lender that cash income after the application of credit will be sufficient for farm operating expenses, replacing depreciable assets, family living expense and debt repayment. It requires good budgeting and financial planning. This could be done by initially isolating the change you wish to make with a partial budget. In other words, a budgeting technique that compares the total reduced income vs. total increased income. If the result is positive, it is worth investigating further and whole farm budgeting can begin and the start of the credit application process. Remember, however, that the figures used in assessing the returns from a proposed change, should reflect your farm and your management ability. Textbook figures or results of other farmers in other parts of the country only distort the true picture. Proper budgeting can only be done from a good set of records that provide useful information.

Repayment

Credit repayment capacity is the amount of money you have each year to service the debt. The amount of money to pay principal and interest after all other cash expenses and family living have been accounted for. In planning your credit proposal, budget with a repayment schedule that corresponds to the length of time to recover the borrowed capital. That is, funds for land and buildings have a different recovery time than funds for livestock and equipment and, of course, than operating money. This will, of course, also affect interest rates. To this end a good cash flow forecast

showing predicated income and expenses should be prepared. In many cases, a one-year cash flow projection is simply not enough. Two to three years is much better as the effects on a change, both positive and negative, often don't show up until 2 or 3 years after the change has been initiated. And particularly, if it is a new farmer application, a five-year forecast may be necessary as it often takes that long before a new entrant starts to see any light at the end of the tunnel.

Again, the figures used for forecasting should be based on your farm experience and your farm's productive capabilities. In other words, don't budget for theoretical maximums because you know it is possible, be honest and realistic and budget for what your records say you have been producing.

Risk

Risk and risk bearing ability is in many ways the most important part of any credit proposal. It is a major factor in determining the amount of credit which can be safely used on most farms and, to some extent, the interest rate that you will be charged. Not only is the farmer, as a borrower, assuming a risk, but he is asking the lender to share it with him. And in many cases, the lender shares a greater portion of that risk than the borrower, particularly with new farmers.

The first step in demonstrating risk bearing ability is a good set of informative financial and physical records. And I don't mean income tax files. Sound financial planning can only begin from a good set of records. One should have a balance sheet or net worth statement that is up to date. Last year's tax statement, which in most cases is almost a two-year old statement, is not good enough. A net worth statement that shows the assets owned and the liabilities owed should be as of the date the credit application is made. Previous balance sheets or net worth statements are useful and will be asked for to show the success or failure of management over time, but one must show his financial position to date. Records will also show past repayment performance and ability to adjust to the ups and downs that affect any farming enterprise.

Now there are many people available to assist in preparing a credit proposal or in doing budgeting and financial planning. These people are available from the lending institutions and from the Provincial and Federal governments. They have the information as yourselves on costs of production, various assistance programs and the objectivity to help you. However, in any credit proposal or application, one should be aware that it is your application and you are going to have to pay the bills. It serves no purpose to have someone else prepare the credit proposal and then you simply present it or mail it to the prospective lender. If you cannot answer detailed questions about your proposal, then the lender loses confidence in you as a manager. So, if you are getting assistance from another individual, be sure to discuss it thoroughly with him and make sure you understand it before you present it to a lender.

Summary

For any credit application, sound financial planning is necessary. Attention to details will have pay-off, both in the farmer's understanding of his own farm business and in communicating that understanding to his creditor of how secure his funds will be. With each credit application, one is creating an impression of himself in the mind of the lender. A favourable impression will do much to foster a good two-way long term relationship.

Remember to satisfy the three R's. Return, repayment and risk. To do that one must have a firm understanding of where he is and where he wants to go. One must have a demonstrated ability to handle the management requirements of what, in many cases, are becoming businesses handling hundreds of thousands of dollars. A good set of records that provides balance sheets and income statements for summary purposes and operating statements, cash flow statements, bank reconciliations for day to day decision making are necessary to do that.

While each of the different lending agencies have their own forms for credit applications, they are all attempting to find out the same thing. Being prepared with a useful set of records and a firm idea of ones total management plan will not make form filling out an onerous task but a means for you to confidently communicate your credit proposal in a way your lender will understand.

As you noticed, I stressed a good set of records. However, it is also important to remember that I am talking about a whole financial and physical information system. Too often

farm records are tax statements for financial information, and except for those on DHAS or herd health, physical production records lack consistency and verification. So concerned are the banks about rectifying this situation that at the recent C.B.A. credit conference, one of the banks made a presentation on what they view as minimally acceptable farm accounting information. This is as follows:

1. Reputable accountant
2. Adequate records system - with up-to-date financial and physical information.
3. Accrual basis
4. Annual inventory with C.A. present
5. Valuations according to generally accepted accounting practices.
6. Financial statements presented by the C.A.
7. B/S, Y statement, changes in financial position

Desirable Options

1. Cash flow projections
2. Monthly or quarterly statements

While it is recognized that this level of sophistication is not going to happen overnight, all of the banks are going to be increasingly asking for this type of information as a condition of credit. This is normal business practice for all other commercial businesses not only to satisfy their creditors but to satisfy themselves as managers.

Up to this point, emphasis has been placed on financial information and management. However, in coping with high interest rates, production management must also be stressed. It is recognized that on the whole as an industry, Canadian farmers can be very proud of their production. You are among the best in the world. But let me refer to the livestock industry and recent studies prepared in Nova Scotia and New Brunswick and to a recent speech to a financial post conference given by Mr. Charles Gracey, Chairman of the Canadian Cattlemen's Association, to illustrate a few points.

Firstly in regard to the hog industry, allow me to quote from the Nova Scotia Swine Farm Business Summary for Farrow to Finish farms in 1980:

"The 1980 Nova Scotia Swine Farm Business Summary provides basic information and statistics on the costs and returns associated with the swine enterprise on Nova Scotia farms. While not based on a statistically sound random sample of swine farms, the summary can be used with care to assist in the analysis of the swine enterprise by providing group average data for comparison purposes.

In reviewing the information contained in the report, the following points can be noted:

- Average farm size measured in terms of sow numbers was 113 sows.
- Average litters per sow per year was 1.99.
- Average pigs weaned per sow per year was 16.5.
- Average sales of hogs per sow per year was 14.1.
- Average market hog dressed weight was 166 pounds.
- Average feed consumption per market hog was 283.23 kilograms for a feed conversion of 2.89.
- Average index of market hogs was 104.

In compiling the data for this summary, extreme variation among farms was noted. This variation was observed in most factors of returns, costs and management factors. Below, we outline a number of variations observed.

- Net Farm Income had a range of $1,269, per sow between the highest and lowest net incomes on a per sow basis.
- Total feed cost per sow had a range of $2,760.00.
- Feed costs as a percent of total costs varied between 83.3 per cent and 45.8 per cent.
- Kilograms of feed fed per hog raised as much as 207 kilograms.
- Pigs weaned per sow varied as much as 12.3 pigs per year.
- Sows kept per man equivalent had a range of 71 sows between the highest and lowest numbers of sows per man.

With such wide variation in many of the returns, costs and management factors, it is difficult to isolate specific characteristics that result in a profitable swine unit. It would appear, however, that a number of the key factors of production outlined above such as production, cost control, efficient use of capital and labor, are of significant importance in determining the success of the farm unit.

Those farm operators who successfully combined these factors of production in the management and operation of their farm units achieved a reasonable return to their labor, capital and management skills."

Another study prepared in New Brunswick compared the effect of interest and production on the cost of raising 100 lbs. of pork. It was found that for every one per cent rise in the prime rate, it added approximately 16¢ - 18¢ in cost per 100 lbs. of production. One less pig per sow per year or half a pig per litter added approximately $1.80 in cost per 100 lbs. of production. Therefore, if the average number of hogs sold per sow in Nova Scotia, and I would expect it is close to the average in New Brunswick, is 14.1, and if one looks at some producers who are achieving close to 20 pigs per sow per year, and in fact some may be exceeding that level, attention to production management can have considerable pay off.

Referring to Mr. Gracey's speech delivered September 28, 1981, titled Adjust to Prosper, I quote:

"Compounding our problem it now appears quite clear that, under present circumstances, we have about reached the limits of effective demand for beef, both in absolute terms and relative also to the supply and price of competitive meats.

Here is an industry where costs of production keep rising and effective demand has stalled. This is a market signal to adjust to a somewhat lower level of production. Furthermore, I foresee that, if inflation continues unabated, if interest rates remain high and as energy costs triple over the next five years, what we have already seen as consumer resistance may only be the beginning. I, therefore, advocate that the cattle industry not expand, but in fact that present levels of production, if maintained, may leave the industry in a state of chronic oversupply.

In summing up this section, I now believe that the Canadian cattle industry should recognize the realities of present circumstances and should recognize that the appropriate level of beef production should be somewhere in the 80 to 90 pound per capita range. That's where we were in the first half of the last decade, the last period of sustained profitability in the cattle industry."

You may be asking yourselves what this has to do with you as potato producers. I feel it serves to illustrate that while you can be justifiably proud of the great gains you have achieved, improved production management can still make an industry stronger. It also outlines briefly the need for orderly organized marketing of agriculture production under the control of those that do the producing.

Specific to yourselves as potato growers, a key management fact to consider is controlling cropping costs. In this regard, I am not talking about radically cutting production costs so as to adversely affect eventual yields and income. You may be able to shave costs a bit here and there without slighting the use of fertilizers and herbicides and other essential inputs. To do this will take a proper plan that plays up your strengths and attempts to limit risk. Crop insurance would, of course, fit into these plans.

Therefore, to save costs, the following may be considered:

1. Optimize soil fertility
   - soil test
   - gear fertilizer rates to soil test results
   - concentrate on lower testing fields
   - make sure fertilizers are balanced to your crop and N.P.K.

2. Weed control
   - fine tune practices
   - proper identification
   - proper herbicide

3. Limit machine hours
   - but don't skimp if it will affect yields

4. Cut fuel usage
   - proper weighting operation and tire selection can save from 5 - 30%
   - If you need new tires, consider radials which can show a 5% improvement in fuel efficiency
   - Shifting up and throttling back on light loads can cut fuel consumption by up to 30% as well as save wear and tear on the tractor.

In conclusion then, it would seem that coping with high interest rates involves paying attention to details. The details of financial management, production management and marketing management. You must take control of your own operations and indeed of your industry and individual commodities. The consumer must be made aware that they cannot expect cheaper and cheaper food, blaming the rise in consumer price index on the cost of food. They must be made aware that you as producers cannot continue to sell your product at less than the cost of production. Those of you that pay attention to the management details will survive our current economic crisis. And while it may not seem pleasant at first, the whole industry will be better off for it in the long run.

The Provincial and Federal governments, the lending institutions, the processors, the consumer and you, the primary producers, have a vested interest in coping with our current economic situation and the continued development of our fine agriculture industry. By working together toward a common goal rather than by attacking and shifting the blame from one sector to another, I am confident that the results we desire can be achieved.

THE NATURAL GAS PIPELINE FOR N.B.

Henry LeBlanc
Senior Representative
Corporate Communications
Trans Quebec Maritime Pipeline

First let me thank you for inviting me here today. We at TQM are grateful for this opportunity because we believe it is vital that those to be served by this pipeline understand what is involved in a project of this sort. We are convinced this pipeline will bring major, tangible benefits to the province and we welcome the opportunity to tell our story.

Before beginning the short slide presentation, I would just like to tell you that our TQM provincial office located here is now beginning to gear up for this project. We have established close contact with government officials and we are beginning to establish contacts with business, labour groups, agricultural federations and others with an interest in this development.

We intend to be very much a part of this province as the project proceeds and, I should say, that our office is always open to those looking for information about this project. We welcome your interest and your inquiries.

And now let's watch this short slide presentation.

As you proably gathered from the slide presentation, the Trans Quebec and Maritimes Pipeline project is a substantial project indeed. By the time the project is completed over 500 million will have been spent in New Brunswick and thousands of man-years of employment will have been created.

To be more specific, it is estimated that, by the year 2000, the total direct and indirect employment in this province as a result of this project will exceed 20,000 man-years for construction alone with a further 26,000 man-years generated in operations and maintenance work.

To further illustrate the significance of this project, it is estimated that, on a typical mainline spread or section, there will be a need for approximately 20 foremen, 82 heavy equipment operators, 157 labourers, 25 downhand welders and 64 teamsters. In addition to this complement will be many more involved in design and survey work, site clearance, clean-up, transportation of men and materials, provision of food supplies, lodging and a host of other goods and services that will be required.

I should further emphasize that it is TQM policy that, consistent with quality, price and availability, preference will be given to companies in New Brunswick for supply of goods and services in New Brunswick. It is our further hope and expectation that the vast majority of jobs will be filled by residents of this province.

Finally, let me say that we at TQM take very seriously our responsibilities to communicate with residents of New Brunswick. In fact, it is not an exaggeration to say effective liaison between communities of this province and TQM is more important than any technical challenges associated with the actual construction of the pipeline. We already know how to bui] a pipeline but constructing it in keeping with the sensitivities and legitimate desires of those to be served raises new challenges.

We believe these challenges can and will be met through effective liaison programs such as this meeting and also through publications, further audio-visual presentations, seminars and one-to-one discussions with interested parties. We are convinced that we must build acceptance in people's minds before we can build in the ground.

Thank you very much for your interest in this project and for inviting me here today.

POTATO SCAB: NEW THOUGHTS ON AN OLD PROBLEM

Frank Manzer
University of Maine
Orono, Maine

Common scab of potato has been recognized for more than 100 years. The accepted causal agent, Streptomyces scabies, is a minute filamentous microorganism, technically an actinomycete, considered by some to be an intermediate form between the bacteria and the fungi. There are many different types of these soil-inhabiting microbes and most of them are nonpathogenic, in fact, beneficial. They are responsible for much of the "earthy" odor of mineral soils and contribute to soil productivity. The scientific literature is filled with conflicting reports on the conditions required for development of common scab in potato, and many of these inconsistencies remain unresolved. One such is the effect of soil reaction, once thought to be the definite answer to controlling the disease at least in some potato-producing areas. It is now suggested, based on research and practical experience, that soil pH per se is not the direct regulator but rather is a general indicator of other factors. Some of the most popular theories suggest that a pH above 5.5 indicates an imbalance of certain cations that govern scab development in the soil.

There have been many isolated reports of scab development at low pH (5.5 and below) and one of the "deans" of this group of organisms, S.A. Waksman, pointed this out as early as 1922, In Maine, sporadic occurrences of scab at low pH

were usually attributed to freakish weather, soil testing errors, or were simply ignored. In 1960, however, since scab affected about 5 percent of the crop in Maine, it could not be ignored. We conducted many tests on seed from affected crops. It was clear that this type of scab could develop in soils that had no previous history of common scab. Since this was an uncommon occurrence in Maine, we first called the disease "uncommon scab". Later it was decided that the name "acid scab" was more descriptive since acid soils (pH 5.5 and below) did not normally support the development of common scab.

The causal agents of common and acid scab are closely related, but we have found relatively clearcut morphological, physiological, and immunological differences between them. Unfortunately, the lesions that these pathogens produce are very similar, and one must resort to involved laboratory techniques or test-plantings to differentiate them. With the advent of the ELISA serological procedure, it may now be possible to identify the organisms directly from scab lesions. However, until the details of this test are worked out, we continue to use an "educated guess" method for quick identification. That is, we ask the grower of a scabby crop: 1) How uniform is the occurrence of scab over the field? 2) What is the pH of the soil and its liming history? 3) What is the history of the seed lot used? Based on answers to these questions we can usually determine which type of scab is involved. However, because this determination is not absolute, we recommend that growers avoid using, as seed, any lots which have an appreciable amount of visible scab.

A common practice among growers in Maine and elsewhere has been to save the scabby pickouts from their seed crops for replanting. This practice suggests a logical explanation for the appearance of acid scab. The process is called natural selection, a concept first described by Charles Darwin in his famous book "Origin of Species". Very simply stated, natural selection means that organisms which are most able to cope with the conditions of their environment are the ones which survive and multiply. Since all organisms produce a range of variation among their offspring, natural selection provides for survival of the fittest of these. Therefore, when seed that is infected with common scab is planted, the scab organism will produce offspring of varying adaptability. If the soil is of low pH, those offspring which may be adapted to that condition are the ones which will survive and multiply. As this procedure is repeated, the likelihood of an acid-tolerant variant being produced becomes more of a certainty.

One can argue that if repeated planting of scabby seed promoted the development of an acid-tolerant scab organism, why did this variant not appear long before it did? A plausible answer seems to be that the variant appeared sporadically, but did not develop to significant levels, because of the frequent need to renew seed sources due to high virus content. Further, broad spectrum seed treatments, such as corrosive sublimate and formaldehyde used to control Rhizoctonia and other problems, gave good control of the scab organism on seed as well. By 1950 in Maine, modern methods of seed production allowed growers to use the same seed source almost indefinitely. At about that time, seed treatment with the aforementioned chemicals was shown to do more harm than good and was largely discontinued. Unfortunately, the

of replanting scabby pickouts was not. This probably set the stage for the development and increase of variants of the scab organism. There is no absolute proof that this did, in fact, happen. However, many pieces of circumstantial evidence support such a theory. Among them are reports of several growers who propagated the same seed lots, and no other, for over 30 years before acid scab appeared in those lots.

In over 20 years of studying the acid scab problem in Maine, we have found out many things which have contributed to the development of successful control measures. We have observed that, under Maine conditions, the acid scab organism apparently does not develop large populations in the soil, though it can survive our winters. Growers, who have had the problem, have successfully avoided further difficulty by: changing seed; using an effective seed treatment such as mancozeb or pentachloronitrobenzene (Terrachlor); and following a good crop rotation. The longer the rotation, the better, but at the very least, potatoes should not follow potatoes where scab or any other disease caused by a soilborne pathogen is involved. Where scab is a problem, there are indications that grain or grass rotation crops may be better than legumes. It should be recognized also that the advent of acid scab did not change any of the rules regarding soil pH and all other aspects of common scab control.

More recently, Dr. R. H. Storch, Professor of Entomology at Maine, and I have been studying an apparent relationship of acid scab and certain soil-inhabiting arthropods, namely mites and springtails. We have observed that these organisms are alsmot always found in acid scab lesions. Furthermore, laboratory studies have shown that they carry spores of the scab organisms on their bodies, and even in their digestive tracts. Field studies show that several soil-applied systemic

insecticides reduce numbers of scabby tubers produced when seed infected with acid scab is planted. This and other evidence suggests that one or both of these arthropods may play a part in the development of both acid and common scab. We are seeking more information on the possible role that these arthropods may play in the development of potato scab.

In summary, I think the most important single aspect of scab control is to avoid using seed lots which have scab. This is important both from the standpoint that we cannot readily differentiate acid and common scab and that planting common scab may promote the increase of acid-tolerant strains of the pathogen. Good rotation practices must be emphasized also because of their effectiveness in reducing many disease problems. Finally, there is still a lot to learn about potato scab including the many variations of the causal agent. In addition, since the soil is an exceedingly complex medium, we cannot overlook the many biological entities present that could interact in scab development.

INFRARED DETECTION OF POTATO DISEASES

The video equipment consisted of a SONY SLO-340 videocassette recorder and a SONY AVC-3450 video camera. The major modifications to the camera were: addition of a Tiffen 37 infrared filter; and replacement of the normal video tube in the camera with a silicon diode array tube. Any qualified video technician can obtain and install the tube and prepare the camera for infrared operation. A neutral density filter (Inconel 1.0 from Corion Corp.) which effects a three-fold F-stop reduction, was found to be necessary to reduce sensitivity to a working range of from F-3.6 to F-11 under normal daylight conditions. Because of the need to reduce motion of the hand-held camera, a Kenyon Gyro Stabilizer (Model KS-4, Ken-Lab, Inc) was used. The camera modifications gave the added advantage of protecting the unit from damage due to accidental exposure to direct sunlight.

The airplane used for this study was a Cessna 170B flown at an airspeed of approximately 100 kph at altitudes of 300 to 400 m. All of the imagery was taken at varying oblique angles through an open window on the left side of the aircraft. In most instances the subject areas were located on Aroostook Farm at Presque Isle, Maine. The fields examined were potato plots used for conducting tests on the efficacy of experimental fungicide treatments for the control of late blight or early blight. Each treatment was replicated five times in plots three rows wide and 8 m long. Rows used for sprayer travel were artifically inoculated to provide a source of infection for the test plots. Aerial imagery was

taken at several times during the growing season to provide a record of disease progress. Visual ratings of disease were made on the ground prior to and following the flights. A wide range in degree of disease development was provided by the differences in control efficacy of the various fungicides used in the test plots.

Imagery obtained with the television equipment recorded healthy foliage as white and diseased foliage as varying shades of gray. The most severely infected plots gave the darkest images and those which were lightly infected appeared as light gray. Visual correlation of image density and ground-rated disease severity appeared to be linear at least through the range of light to moderate infection and evidence of previsual disease detection was also obtained. No attempts were made to measure the range of duration of the previsual period because varying environmental conditions can cause wide variations in the rate of progress of a disease. During dry, inactive periods, field ratings were in good agreement with ratings based on infrared imagery flown the same day. However, during periods favoring disease progress, imagery ratings were 1-3 days ahead of field ratings

Comparison of video images with the potato plots from which they were taken was accomplished by photographing the monitor screen using black and white Polaroid film (ASA 3000). Though there was some loss of resolution Polaroid prints gave a rendition of the video image which proved adequate for field reference purposes.

Video infrared imagery was very similar to black and white infrared photographs obtained by Manzer and Cooper (1). The major advantage that disease detection via infrared video has over even black and white photography is, as previously mentioned, timeliness. Instant viewing of the tapes, even while in the air, allows an operator to radio information directly, if need be, to those involved in the application of disease control measures. A further advantage of video equipment is that the operator sees the subject in the viewfinder exactly as it appears on the tape. This makes it possible to take zoom-lens close-up shots of any area which may be of special interest. An added feature is the simultaneous sound recording which allows the operator to voice-record information on geographical location and other pertinent details concerning the subject.

Some disadvantages of the system as compared with black and white photography are its higher initial cost, poorer resolution, additional weight and bulk and the requirement of an electrical power source. Though the equipment as described represents an investment of around $5,000, quality aerial cameras, film, and processing are not appreciably lower. Image resolution can be important for certain types of surveys but for the purpose of locating even small areas of late or early blight infection in potato fields, it was found to be adequate.

Should it prove desirable, high resolution photograhy in either false color or black and white infrared could be taken to provide hard copy back up data for the videotaped data. A high quality video monitor will also improve the imagery

in comparison with that shown on the average television receiver. The recording equipment can be easily carried by a shoulder strap and the camera is no more difficult to handle than the average 70 mm photographic camera. A lightweight, rechargeable electrical power pack is provided as part of the unit and the 12 volt electrical system of an airplane can also be used. On balance, we suggest that video infrared survey can become a useful tool to the practical plant pathologist, particularly so in IPM programs. As did infrared photography, video infrared may likewise find uses in other disciplines. Further improvement of the equipment including use of false color may also be possible.

MAINE SEED POTATO REGULATIONS

Joseph L. Harrington
Director, Division of Plant Industry
Maine Department of Agriculture
Augusta, Maine

Maine has been in the business of Certification of Seed Potatoes since 1914. For the most part of this period two men controlled its destiny, E.L. Newdick for 47 years and Paul Eastman for 30 years. This resulted in stability of the program.

Seed Potato Certification is carried out by John Foster, supervising inspector and thirteen seed potato inspectors, each working year around in his respective area. In addition to seed potato inspection, these inspectors work with the Imported Seed Potato Regulations (when they are legal), Planting Certified Seed Regulations, and carry out Golden Nematode surveillance.

In Maine, we also have a Maine Seed Potato Board consisting of six potato growers and the Commissioner of Agriculture. Camille Morneault is its Program Director. Functions of the Seed Board are as follows:

1. Porter Seed Farm for production of Elite Seed.
2. A Florida Test Farm for winter testing of seed.
3. Sangerville Seedling Farm for increase of new varieties.
4. Foundation Seed Roguing Service.

Maine's Certified Seed regulations, which are promulgated under the Administrative Procedure Act in which grower input is considered, are as follows:

REGULATIONS GOVERNING CERTIFIED SEED POTATOES IN THE STATE OF MAINE

1. Application

Application for certification must be made on application forms available from Division of Plant Industry, Augusta or Presque Isle. Deposit and inspection fees schedule are on the application. Application must be received before June 15. Tags or proof of purchase must accompany application to provide sufficient evidence as to origin and quality of seed. Growers' own seed shall have certification number for identification. Certified Seed with a record of Spindle Tuber will not be eligible for certification.

2. Imported Seed

All seed from an out-of-state source shall comply with the Maine Seed Potato Import law.

3. Field Standards

Each field entered for Certification shall receive at least two field inspections spaced approximately one month apart during the growing season. A third, or more inspections, for Bacterial Ring Rot will be made after the second inspection and before completion of harvest.

4. Standards for Field Inspection

	First Inspection	Second Inspection
Leafroll	2%	1%
Mosaic	3%	2%
Spindle Tuber*	½%	½%
Total Virus	5%	3%
Varietal Mixture	1%	.25%
Bacterial Ring Rot or Root Knot Nematode	No tolerance	No tolerance

*Any lot in which Spindle Tuber is detected will not be eligible for Foundation.

5. Withdrawal

A. Any disease or pest that might adversely affect the Maine Potato Industry of Maine Agriculture in the opinion of the Maine Commissioner of Agriculture, will be cause for withdrawal of certification.

B. Any condition such as foliage diseases, excess weeds, hail injury, foreign plants, chemical damage, insect damage or soil conditions that interfere with proper inspection may be cause for withdrawal of certification.

C. Detection of Bacterial Ring Rot in a Florida Test sample will be cause for withdrawal of certification of lots represented by the sample.

6. Florida Test Requirement

Southern Testing is required for final certification of the following varieties: Katahdin, Russet Burbank, Chippewa, Superior, Ontario, Norchip and Bel Rus. Only those lots of the above listed varieties showing not more than 5% total virus disease Mosaic and Leafroll or .5% Spindle Tuber will receive final certification.

7. Foundation Program

Fields entered in Foundation Roguing Program of the Maine Seed Potato Board are automatically entered for certification and Florida testing upon acceptance of application for this service. In addition to the roguing service, these fields will receive all inspection of certified seed.

8. MH-30

Any field treated or partially treated with Maleic Hydrazide (MH-30) sprout inhibitor, or any other sprout inhibitor applied to the growing crop, shall be withdrawn from certification.

9. Sanitation and Identification

Certified and Foundation seed storage shall be cleaned and disinfected before storage. Bins shall be easily identified to enable Certified Seed Inspectors to locate all seed lots and post bins cards when necessary.

10. Fusarex R Treatment

Any lots treated with "Fusarex" R must be treated with the amount recommended by the manufacturer or less and applied in a uniform manner as recommended by the manufacturer. Uneven application or treatment with excessive amounts shall be cause for withdrawal of certification. All lots treated with "Fusarex" R in the prescribed and recommended manner shall have "Treated with Fusarex" R printed on the certification tag and/or on the certificate accompanying the shipment of seed so treated. All bins treated with "Fusarex" R shall have the fact marked on bin tags attached to each bin so treated.

11. Bin Sprout Inhibitor

Treatment of any bin in a storage containing Certified or Foundation seed with Chlro-IPC (Isopropy 1 M-chlorocarbamllute), or any other gaseous applied sprout inhibitor, will be cause for withdrawal of certification on all certified or foundation seed stored in the storage.

12. Foundation Requirements

Additional requirements for Foundation Seed:

A. All potatoes planted on the farm must be entered for certification.

B. Only those farms where no Bacterial Ring Rot is found during the current season are eligible to have foundation seed. Any lot in which Spindle Tuber has been detected will not be eligible for foundation seed.

C. All lots must be represented by a sample of the prescribed size in the official Maine test plots in Florida and only those showing less than .5% total virus diseases Mosaic and Leafroll and no Spindle Tuber will receive Foundation designation.

D. Generation I and Generation II Foundation seed must meet additional regulation governing production of these two classes of seed.

E. Foundation Seed potatoes will be tagged with a gold tag with the word "Foundation" when used for Regular and Special sized seed. Other sizes will use the same colored tag as corresponding certified seed but with the word "Foundation" added to the tag.

13. Grade and Size

Maine Certified and Foundation Seed Potatoes must be packed to meet Maine Seed Potatoes Grade.

Seed Sizes and Identification as follows:

Sizes		Identification
Regular	1 7/8 - 3 1/4	Blue tag - Grade
Small	1 1/2 - 2 1/4	White tag - Grade
Size B	1 1/2 - 2	Green tag - Grade
Special Sizes within limits	1-3 1/4	Blue tag - Grade and size

14. Special Permit

Permits to ship Maine Certified and/or Foundation seed potatoes not conforming to any of the grades listed in proceeding paragraph, may be granted by the Commissioner of Agriculture upon application by the shipper, stating receiver's name, reason for request and approximate quantity to be shipped. Any shipments made under such a permit must be inspected by a seed inspector and identified as seed as prescribed by the Commissioner, and must meet the requirements of Maine Seed Potato Grade regarding foreign material, decay, freezing or soft breakdown, and must in all respects other than size and grade, meet all seed certification requirements. Special Permit shipments shall be tagged with a Red Tag stating grade and size and variety.

15. Bulk Shipments

Bulk shipment of certified and foundation seed potatoes is permitted, and such shipments are identified by a bulk certificate issued by the seed inspector. This certificate gives variety size, grade and approximate weight of potatoes in the load. It purports to identify the lot only as long as it is in the original conveyance as identified on the certificate.

16. Shipping Fees

Shipping fees, which include tag, will be issued each year in July.

17. Packer

Packing of Certified Seed. Any person, firm or corporation engaged in grading, sizing and packing Maine Certified Seed

Potatoes which have been bought or otherwise obtained from others, shall be considered a seed packer. Any such packer must apply to the Maine Department of Agriculture for prior approval of his packing facilities before starting his season's operation. Approval will be granted only to those operators who are so set up that they can comply with the following regulations.

A. A separate door with separate grading and handling equipment must be maintained for the purpose of handling Certified Seed. Only potatoes from fields which have met all certification requirements can be received through this door or handled over this equipment.

B. Complete and accurate records must be kept showing the grower, variety and amount of potatoes received at this location. (Form 200 will be provided for this purpose.)

C. If lots from different growers are mixed in this operation, the certification tag will be stamped with his name or packer. If large lots are handled from individual growers and kept separate, the grower's tag may be used.

D. Sanitary priorities and handling procedures must satisfy the Maine Department of Agriculture. This provision includes cleaning and disinfecting equipment where necessary, and use of handling methods which provide against varietal mixture.

Whenever the Maine Department of Agriculture may determine that any packer is not complying with the above regulations, certification will be withdrawn.

18. Ring Rot Detection

Should ring rot be found during the packing operation on any lot of certified seed - certification of potatoes remaining in the bin, and potatoes grown from the same seed source in other bins, will be withdrawn at once. Packing of certified seed from any otherlot in the storage or packing house will not be permitted until the affected lot is "Binned up" or segregated so as to be unaccessible when other bins or lots are being graded.

In addition, no tags will be issued or certified seed packing certificates issued before the entire storage or packing house work area and potato grading and handling equipment has been cleaned and disinfected by the shipper and meets the approval of the seed inspector.

19. Unacceptable Varieties

None - As of February 1, 1980

PSYCHOLOGY OF POTATO VINE KILLING

Hugh J. Murphy
Professor of Agronomy
University of Maine
Orono, Maine

Killing potato vines as a pre-harvest procedure has been a widely accepted practice in the United States and Canada, particularly where potatoes are stored for extended periods of time. There are many reasons for killing potato vines but I would like to speak to you about one in particular today and that one is the use of vine killing as a means of hastening plant maturity for hardening or setting the skin of tubers so that skinning, bruising, and storage losses can be reduced.

The title which I have used here today has a meaning to it primarily because I am trying to convince you to do something which you know you should have done but have not wanted to do. I have brought along some data today which I hope will influence you to consider killing potato vines at an earlier date than what you have been used to.

Traditionally, we have planned on killing potato vines and having them ready to harvest in a matter of 14 days. After 30 years of experience in this field, I have finally concluded that this is an absolute impossibility and primarily because new pesticides in the form of fungicides and insecticides, and the increased use of nitrogen fertilizers have kept these vines growing for a longer period of time. Just about the time we need to kill these vines to get ready for harvest, they are just starting to grow nicely; and, of course, just like you, they are going to resist the killing process.

The data which I have to show you here is the result of what we call quality and maturity work done at Aroostook Farm in Presque Isle. What we were particularly interested in was how much does yield increase during the killing process at different killing dates, and how much does yield increase if we didn't have to use the killing process?

In Table 1 for the Katahdin variety, notice that we set this project up and started our harvesting at 100 days after planting; and also that we dug at weekly intervals throughout the harvest period or for a total of 28 days. At the 100-day period, we also killed the remaining vines and then harvested samples at 7 days, 14 days, 21 days, and 28 days. As you will note, we did get an increase in total yield all the way from 229 cwt. at 100 days to 339 cwt. at 128 days which is a substantial increase. Most people like to let them go and get this increased yield but note that where we harvested at the end of 7 days, our yield had dropped to 245 cwt. When we allowed the desiccation period to extend to 28 days, our yields kept increasing so that we only had a yield of 316 cwt. So, people are going to look here at the 339 cwt. of the green unkilled potatoes at 128 days and where we have taken 28 days to kill them at 316 cwt. and assume that they have lost, for all essential purposes, 23 cwt. in yield.

Table 1. Effect of date of top-killing on the yield of Katahdin potatoes (Cwt./Acre).

	Days from Planting				
	100	107	114	121	128
Green	229	287	341	370	339
Killed 7 days		245			
Killed 14 days			324		
Killed 21 days				318	
Killed 28 days					316

However, we took samples from this particular harvest, stored them through a four-month period, and determined the shrinkage losses. The shrinkage losses in this particular case represent the physical weight loss plus whatever rot developed as a result of immaturity in the potato tubers. This shrinkage data is given in Table 2. Notice that as the potatoes were allowed to grow for longer periods of time, we went from a 36 percent shrinkage loss down to 28 percent at 128 days. The thing that is noteworthy is that the shrinkage losses decreased as we extended the vine killing period. We went all the way from 36 percent shrinkage losses at 100 days and green vines down to only 9 percent shrinkage losses when we took 28 days to kill these potatoes and let them harden up in the ground.

Table 2. Effect of date of top-killing on the percent shrinkage of Katahdin potatoes at 45F. for 4 months.

	Days from Planting				
	100	107	114	121	128
Green	36	36	34	30	28
Killed 7 days		21			
Killed 14 days			18		
Killed 21 days				14	
Killed 28 days					9

If you take these shrinkage figures and apply them towards the yields in Table 1, you will come out with marketable yield or the number of pounds of potatoes that 'go in the bag'. I have done this and have given you the results as shown in Table 3. Notice that with the green vines, the marketable yields increased with time and that strangely enough at each killing date we also increased the marketable yield. This, of course, is related to the shrinkage losses which are involved. The bottom line in this particular study, as indicated in Table 3, is net gain. Notice that at 107 days we had increased 10 cwt. of usable yield for the 7-day killing period, 41 cwt. for the 14-day killing period and 44 cwt. when we took the full 128 days. The 14 cwt. gain at the 21-day killing period is probably in the statistics more than in reality.

Table 3. Net effect of date of top-killing on marketable yield of Katahdin potatoes

	Days from Planting				
	100	107	114	121	128
Green	147	184	225	259	244
Killed 7 days		194			
Killed 14 days			266		
Killed 21 days				273	
Killed 28 days					288
NET GAIN		-10	-41	-14	-44

Another bit of data which we recorded during this period, because I believe it's an indication of how well these potatoes will stand up during the harvesting and handling operation, is called the skinning index. This data is presented in Table 4 where you will notice that as the potatoes are allowed to grow closer to maturity, the skinning index decreases which indicates that the tubers are hardened up and will not skin as much during the harvesting operation.

Table 4. Effect of date of top-killing on the skinning index of Katahdin potatoes

	Days from Planting				
	100	107	114	121	128
Green	80.0	70.5	29.2	14.2	17.5
Killed 7 days		47.4			
Killed 14 days			25.2		
Killed 21 days				9.6	
Killed 28 days					6.5

Note that at 7 days 47.4 percent of the surface of the tubers skinned; when we allow 28 days for the killing process to take place, we reduce skinning to 6.5 percent. These data to me are quite convincing that we should be taking a longer period of time to kill these vines. We are not losing as much yield as many people expect, particularly when you look at it from the standpoint of marketable yield rather than total yield. You want to remember that simply gaining a lot more total yield doesn't put a lot of money in your pocket. These are potatoes that you are going to have to handle along the way somewhere during the harvesting, storing, and marketing operation. So, if you are going to get these losses anyway, probably it would be advisable to take the longer period of time to kill the potato vines and come out with a higher marketable yield. Now, I agree with most of you that 28 days to kill potato vines is probably unrealistic particularly in our area; but certainly we can accommodate the 21-day killing period. So, I am suggesting to you that for the round, white varieties, which are exampled by the Katahdin, you take the longer period of time to kill potatoes and hopefully come out with a higher marketable yield.

We also did similar studies with the Russet Burbank variety and I have this data for presentation to you. You will note in Table 5, as we went from a 114 day growing period to 142 days, we increased our yield from 243 cwt. to 368 cwt., which is a substantial yield. Also note in that period of time that we did not get any significant change in the specific gravity of the tubers. When we took 7 days to kill the potato vines, we got a quick decrease in specific gravity. As we extended the killing period to 28 days for the Russet Burbank, notice that our yield did increase but we only had 8 cwt. difference between the green and the killed vines. Notice how the specific gravity increased with the longer desiccation period.

Table 5. Effect of date of top-killing on the yield of Russet Burbank potatoes (Cwt./Acre).

	Days from Planting				
	114	121	128	135	142
Green	243	295	310	367	368
	(1.078)	(1.075)	(1.078)	(1.078)	(1.077)
Killed 7 days		271			
		(1.072)			
Killed 14 days			296		
			(1.075)		
Killed 21 days				345	
				(1.079)	
Killed 28 days					360
					(1.082)

If you are selling potatoes for the production of french fries and if there is a premium for the higher specific gravity potatoes, this is another thing that must be considered in favor of the longer vine killing period.

In Table 6, we have the shrinkage data for the Russet Burbank variety. Notice that we stored them a longer period of time, for five months; whereas the Katahdins were stored for only four months. Notice that as the Russet Burbanks were allowed to grow longer, they hardened up and we got less shrinkage loss in storage. However, when we extended the killing period to 28 days, notice that we dropped from a 9 percent loss down to only a 5 percent loss which is a pretty decent figure for any potato variety.

Table 6. Effect of date of top-killing on the percent shrinkage of Russet Burbank potatoes stored at 45F. for 5 months.

	Days from Planting				
	114	121	128	135	142
Green	26	26	22	16	9
Killed 7 days		21			
Killed 14 days			12		
Killed 21 days				8	
Killed 28 days					5

Applying the shrinkage data in Table 6 to the total yield data in Table 5, I've come up with the marketable yield which are presented in Table 7.

Table 7. Net effect of date of top-killing on marketable yield of Russet Burbank potatoes (Cwt./Acre).

	Days from Planting				
	114	121	128	135	142
Green	180	218	242	308	330
	5%	13%	35%	38%	42%
Killed 7 days		214			
		11%			
Killed 14 days			260		
			27%		
Killed 21 days				317	
				27%	
Killed 28 days					342
					35%

If we compare the green plots through the harvesting period, we go from 180 cwt. to a high of 330 cwt. at 142 days. As we lengthen the killing period from 7 days to 28 days, notice that the marketable yields do increase. Now the net gains given in this table are not as significant as those for the Katahdin variety but we did get a net gain and that coupled with the improved specific gravity for the 28-day killing period should be justification enough for you to consider the longer killing period for the Russet Burbank variety.

Skinning indices are given in Table 8 and the Russet Burbank just the same as with the Katahdin, the longer the growing period or the longer the time taken to kill the potato vines, the less skinning occurred on the tubers and obviously the better they come out of the harvesting and handling operations.

Table 8. Effect of date of top-killing on the skinning index of Russet Burbank potatoes.

	Days from planting				
	114	121	128	135	142
Green	77	68	35	28	24
Killed 7 days		56			
Killed 14 days			30		
Killed 21 days				23	
Killed 28 days					16

I don't know what more I can say to influence you but my whole philosophy is simply that we've got to consider taking these longer periods of time if we want to harvest potatoes that are mature and will store well. Whether we market them as a fresh market product or take them in for processing, our marketable yields in either case should be considerably higher.

Just a couple of more items before I close. There has always been a lot of discussion as to how to vine kill. You hear the questions, "should I use a chemical only? Should I use rotobeating only? Should I use rotobeating plus a chemical?

Should I roll and apply a chemical? What really should I do? We have made numerous attempts to study this particular item and probably the first thing that we checked on was the effect of rotobeating plus the use of a chemical which is usually called a "quick kill" as compared to the use of a chemical only which is usually called a "slow kill". In Table 9 you will note that we did this for three varieties, Katahdin, Kennebec, and Russet Burbank.

Table 9. Effect of method of vine killing on yield and percent shrinkage of three potato varieties.

	Rotobeat		Chemical	
	Chemical	% Shrinkage[1]	Only	% Shrinkage[1]
Katahdin	376	14	397	9
Kennebec	391	18	403	12
Russet Burbank	364	12	378	12

[1]At 45F, for 3 months.

Taking the Katahdin as an example, where we used the rotobeater and followed it with a chemical, the yield was only 376 cwt. as opposed to where the chemical only was used, there was a yield of 397 cwt. Going to the Russet Burbank, notice that our yields went from 364 cwt. to 378 cwt. Now this should be expected because if you chop the vines off by rotobeating and then put the chemical on, you have lost whatever carbohydrate or whatever growth you can get out of the vines while they are going through

the drying process. We also did shrinkage studies on these samples, as well, and you will notice that when we used a chemical only, which means we're taking a longer period of time to kill the vines, the shrinkage losses do decrease with everything except the Russet Burbank in this particular study.

Another study that was done at Presque Isle was to determine the effect of rolling versus rotobeating versus chemical treatment only on the desiccation of Katahdin potato vines. These data are shown in Table 10.

Table 10. Effect or rolling versus rotobeating versus chemical treatment only of potato vines on percent desiccation of Katahdin potato vines.

Treatment	Percent Vine Kill			
	7 Days		14 Days	
	Leaf	Stem	Leaf	Stem
Chemical Only	30	5	70	40
Rotobeating - Chemical	30	5	50	30
Chemical - Rotobeating - Chemical	40	5	60	30
Rolling - Chemical	40	5	60	30
Chemical - Rolling - Chemical	40	5	70	35
No treatment	0	0	0	0

Notice that if we used the chemical only, we got 70 percent leaf kill at 14 days and 40 percent stem kill. Where we used the rotobeating plus chemical at 14 days, we had killed only 50 percent of the leaves and that would mean 50 percent of the leaves were remaining but the stubs or whatever was left had only 30 percent killed. My recollection is that we were getting some re-growth on these vines at that particular time. Where we used a chemical first and then rotobeat and then put on the remaining chemical, which would be a split treatment, we didn't seem to find much improvement. We only got 60 percent leaf kill and 30 percent stem kill. Notice that where we rolled the vines and then put on the chemical, there didn't seem to be any improvement over the chemical plus rotobeating plus the chemical. Where we used the chemical plus the rolling then put on the remaining chemical, we did get a slight improvement in both the leaf kill and the stem kill as well. There are some reasons for this. I don't really advocate rotobeating because I think we ought to sap the vines for any carbohydrate that is there and we do get some increase in yield. If we rotobeat, obviously we tend to stop growth at that particular point. The only thing that has ever happened, at least in my experience, we usually don't beat the vines low enough and we get a lot of re-growth. If we happen to be growing a seed crop, this new growth that comes along is a good area for current season infection of leafroll. I don't advocate rolling primarily because it could be a great way of spreading blight spores. If you juice the vines up, it could be a good way of disseminating many of the virus diseases that are spread by juices from one plant to the other.

The other possibility is that as we roll, we tend to fill in the cracks on the surface of the row and we do exert a pressure on the tubers particularly those that are near the surface and many could show up later in the season, particularly in a year when we have a high dry matter content of tubers, with an undue amount of pressure bruise and blackspot occurring as a result of rolling the vines. So, my advice to anybody is to use a chemical and then prior to the harvesting, if you need to rotobeat to chop up the vines somewhat, do it after the vines are dead. I think that most of our harvesters are equipped to remove these vines. In fact, most of them want the vines in the long form so that they can grasp them and carry them over the harvester in that manner.

I guess that concludes what I have to say to you people. I've enjoyed being here and talking with you and I hope you will invite me back again some time. Thank you very much.

ELECTRONICS AND POTATO HANDLING

Dr. Neal D. Hallee
Agricultural Engineer
Cooperative Extension Service
University of Maine
Orono, Maine

Thank you Mr. Chairman for the kind introduction. It is my pleasure to be here with you today to discuss some of the advances I am aware of that are being made in the application of electronics to potato handling.

Various electronic devices have become an integral part of our everyday life. We use pocket calculators to perform many mathematical exercises. Some of these pocket size units also have limited programming capabilities allowing us to perform more complex mathematical functions with ease. There are, in addition, special purpose calculators designed for a particular use, such as checkbook balancing. Even digital clocks and digital watches are commonplace. These devices not only give us the time of day, but also the day of the week, date, month and year. Not only that, they know which months have more days than others. The advent of the home television games, such as Atari and Intellavision, and the myriad of hand held electronic games, many of which are patterned after every sport imaginable, have brought electronics into the entertainment field.

The ultimate in this development is the personal home computer such as the TRS 80 or Apple. These devices have found many uses in the home, particularly in the areas of budgeting, record-keeping, taxes, and menu planning. Many aspects of our farming operations can be accomplished with these computers. In addition to the financial area, these units have applications in dairy herd management, feed ration mixing, crop spray scheduling and equipment selection. I heard someone say that there is a potato farming game you can play with the computer. The program leads you through a potato crop production year and asks you to make certain management-type decisions during the crop year. At the end of the program, the computer tells you how much money you lost (or made) during the year.

At this point you may be wondering why this technological development isn't being applied to a more useful purpose, such as potato handling. There are some advances being made in the general fruit and vegetable handling and packing areas, as well as some specifically for potatoes. However, these advances are not coming as rapidly due to the extensive research and experimental work which must accompany these types of applications to assure accuracy and reliability.

Grading and sizing operations, which tend to be highly labor intensive, are receiving considerable attention with regards to electronics development. One of the major problems that had to be overcome was the singularizing of the flow by mechanical means. It was necessary in these operations that each item be looked at individually to determine acceptance or rejection. It was therefore necessary to develop mechanical conveying equipment that would present the material to the

electronics device in a single file formation, in multiple lanes, while still maintaining the necessary flow rates required for the overall system.

Sunkist Growers, Inc., located in California, has developed the EMG (electro-mechanical grader) for the citrus industry. This unit sorts on the basis of color and surface blemishes. Also, by utilizing low level X-Ray, it can evaluate internal damage - not only detecting the damage but also measuring the exact amount of damage for grade determination. The specific requirements for the various grades are programmed into the computer controlling the device, and the sorting is accomplished completely electronically with only an operator required. One of these units can look at ten items per second with about a 75% efficiency. One computer can handle up to six units. Development work has progressed to detect blemishes as small as a nailhead. Other applications involving a combination of optical scanners with weight sizers have been developed to accomplish both grading and sizing operations within one piece of equipment controlled electronically.

A computerized potato photo-sizer is currently available. Using a singularized flow, this unit sizes according to the physical dimensions with the computer determining the volume and converting it to a weight measurement. This two-channel unit is capable of sizing into four weight categories with an undersize and an oversize. The weight categories are indicated on the Selectomatic panel. This unit has a capacity of 200-225 cwt/hr, or five to six tubers per second per sizing lane, and is controlled by electronics.

Produce bagging, and in particular potato bagging, has also seen many advances in electronics applications. There are several different makes of these automatic baggers currently available. These units are capable of positioning the empty bag, weighing the produce that goes in the bag, filling, closing and releasing the bag entirely through electronic controls. The only labor requirement is for one tender to make sure an ample supply of bags or bagging material is available and to trouble shoot the bagging unit should a problem occur. This person can handle several of these bagging units. Typical capacities of some of these units are in the ten to twelve bags/min. range while others have capabilities as high as twenty bags/min.

Another aspect of potato handling that is receiving attention presently with regards to electronics applications is the area of potential damage evaluation of potato handling and harvesting equipment. This is the area of electronics applications that I am more keenly interested and actively involved in. Many of you are probably aware of our Anti-Bruise efforts in Maine, particularly those associated with our potato harvest. We are currently expanding these efforts to encompass all aspects of potato handling and packaging, from the field to the retail store shelf. A summary of the information we have collected to date for various potato harvesting and handling operations is contained in Table 1. In this table, serious bruise refers to potatoes that are out-of-grade because of bruise damage. Slight bruise refers to potatoes that have received bruise damage but are still considered in-grade. Slight bruise damage prior to storage allows for the infestation of disease organisms, such as fusarium and soft rot, which will result in out-of-grade potatoes unless proper storage management techniques are employed. The potential exists for a

loss of 20% of the potato crop due to bruise damage with 13.5% resulting from bruise damage only and the remaining 6.5% resulting from a combination of bruise damage and disease infestation.

The present techniques for bruise evaluation are quite time consuming and costly. They involve repetitive sampling and sample evaluation to attain some level of accuracy in the results. A better method is needed to allow for quicker evaluation of the equipment and/or handling procedure involved with some assurance of accuracy in the results. One such method involves the application of electronics to potato handling practices.

Table 1. Average Amounts of Bruising in Maine Potatoes from Harvesting and Handling Operations

Operation	Slight Bruise (%)	Serious Bruise (%)
Harvesting	5.35	4.93
Bin Filling	0.87	2.06
Grading and Packaging	7.61	4.23
Shipping and Handling	3.25	2.30

This electronics application involves constructing an artificial potato from a suitable material and equipping it with the necessary electronic components to allow measurement of some variable that could be related to bruise damage and

some means of obtaining this information and recording it for analysis. A schematic of such a device is shown in Figure 1. In this device the variable to be measured and related to bruise damage is the acceleration upon impact of the artificial potato with a hard surface or other potatoes. The means for obtaining and recording this information involve the principles of telemetry, which is the radio transmission of electrical information that is proportional to something. In this device the accelerometer measures the acceleration upon impact in terms of a voltage signal. This voltage signal is conditioned and transmitted by the accompanying electronic circuitry to an FM receiver located outside of the handling equipment.

Even though the technology to accomplish the electronics portion of this device is readily available, there are many other problems which must be overcome before this proposed device becomes reality. The major problem areas are the minaturization of the components to meet the size and weight restrictions, property matching between the artificial potato and an actual potato to assure identical response in a handling system, and a significant amount of research to establish the relationship of acceleration upon impact to bruise damage in actual potatoes. There is currently research in progress in Maine, Idaho, Scotland and New Brunswick that is addressing these issues. I sincerely hope the results of this work will be available soon.

I think you can now see, from the remarks that I have made, that there is a significant amount of electronics development taking place that is applicable to our potato handling practices. In the very near future, you will see that electronics development will mean more than fun and games.

Thank you very much for your kind attention.

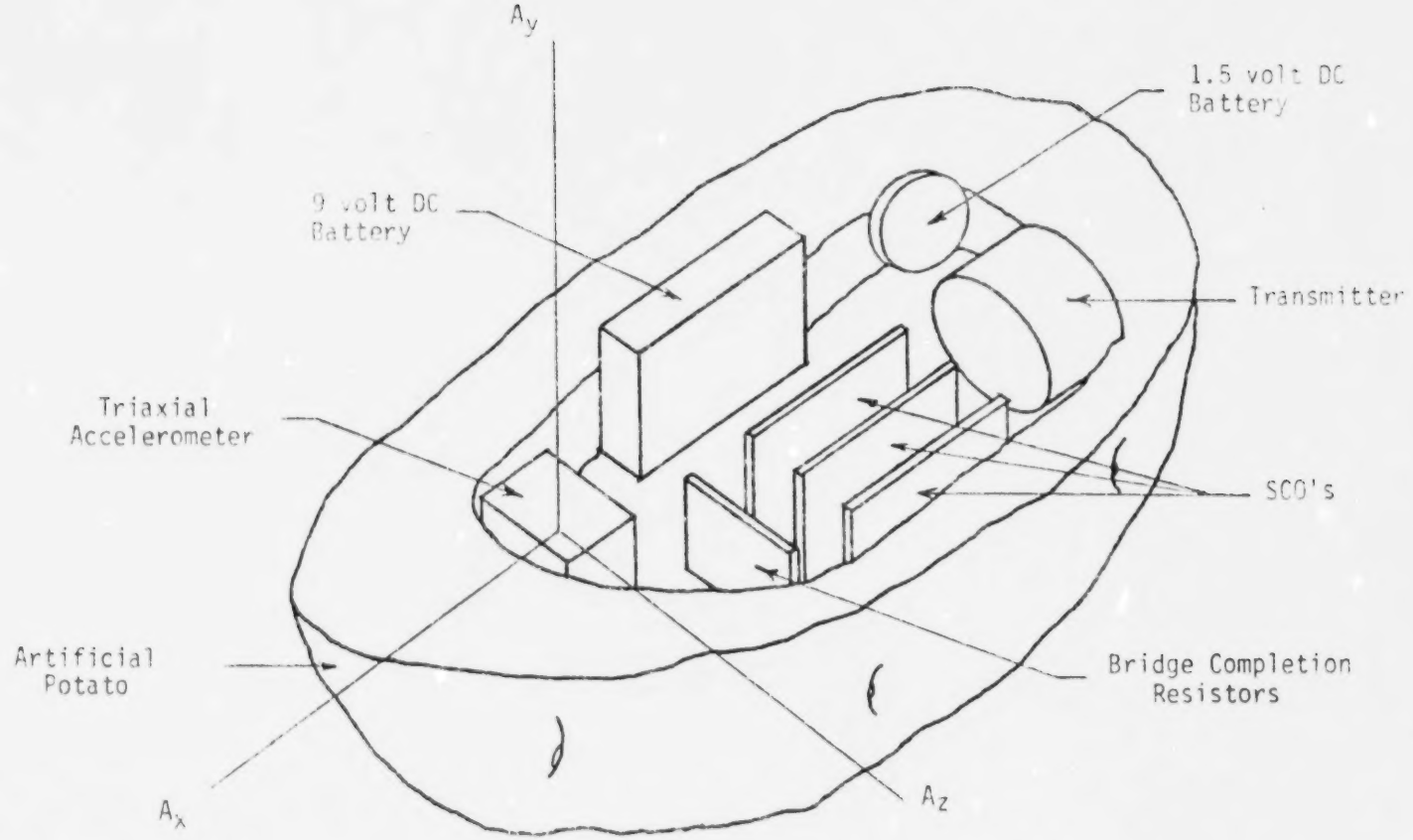

Figure 1. Schematic Diagram of Instrumented Artificial Potato.

SEEDS ACT

J.M. Mulders
Director Seed Potato Division
Agriculture Canada
Ottawa

My boss, the Hon. Eugene Whelan, will address you shortly. I know he has put in a lot of effort on your behalf. In my travels abroad, meeting with officials of EEC member countries he often had been there already or was scheduled to arrive to push for access of our seed potatoes.

Our paths finally cross and what better place than the heart of the potato country of New Brunswick.

You have had a full day and I do not wish to wear you out further. I will touch on some of the subjects already presented as they relate to the seed certification program. And to make it a little easier for you and me, I have a few slides to visually display the items under discussion.

Organization

Most activities of the seed potato certification program, that is the inspection and certification is under the Food Production and Inspection Branch. There is the operations side where the Regional Director (Redge Greene for the Maritime Provinces) under the Director General of operations, Real Roy, carries out the day to day functions.

Then there is the program directorate in Ottawa, where under the Director General, Bob Wight, five divisions are the guardians of policy and are responsible for longterm planning.

I am taking some time to explain this to you as there has been much confusion about who is responsible for what. The Divisions are: Pesticides, Feeds and Fertilizers, Seed, Seed Potato and Plant Quarantine. Refer to Table.

The Seed division works under the Seeds Act as does the Seed Potato Division and administers the licensing of varieties. The Plant Quarantine Division at one time included Seed Potato Certification when it was called Plant Protection but not now. It issues phytosanitary certificates for export and is responsible for keeping new pests out such as the Colombia root know nematode.

The task of the Seed Potato Division is to regulate and control the quality of seed potatoes supplied to Canadian and international markets.

The Division is heavily involved in marketing, negotiating access for our seed potatoes in foreign markets, accompanying missions at home and abroad, investigating foreign complaints. In general, it provides technical support to the marketing thrust of the Department.

In fact, the seed potato certification program is considered a marketing activity which is the responsibility of the Marketing and Economics Branch.

This makes it sometimes difficult for the Seed Potato Division to respond quickly and positively to the needs of the industry.

Regulation Changes

On July 3rd, 1980 an amendment was pushed through fairly quickly to tighten control over ring rot. This followed discussions in Europe in May when it became apparent that if we did not have some kind of equivalency to their ring rot provisions, we would have no hope of regaining access.

Normally, we count on 3 years of consultation with provinces and the industry but this was simply not possible.

Since then we have had a lot of discussion. As a result, this is the agreed to new version to become law in the near future. The 1980 amendment also introduced a zero tolerance for Spindle tuber and Witches' broom. The latter is of little concern to you. Another item Section 52(2)(d) in that amendment is of considerable importance as it introduces testing for ring rot. This has been used already extensively in Quebec to determine whether a seedlot not showing obvious symptoms was infested or not. We use the gram stain and latex agglutination tests. Refer to Tabie 2.

With your cooperation, by following federal and provincial regulations and recommendations, BRR should soon be a thing of the past. We are developing a standard procedure to idenfity contaminated seedlots,

The testing I mentioned before is going to help us to identify the BRR source. If ever you are unfortunate enough to be involved in ring rot. Table 3 is the working definition of a farm. This means that not all production units of a grower may be involved if they are managed separately.

Table 4 is a comparison of the principle features of the old and new program. These amendments are in their final stages, they have been discussed over the past 1 1/2 years and should come into effect in the very near future. For all practical purposes they are now in effect.

Pre-Elite Production

For some years now, this system has been used in other provinces except for the meristem culture featured only in Quebec. It is designed to eliminate tuber-borne diseases. It allows for the elimination of viruses in nuclear stock and makes rapid multiplication of new varieties possible. Refer to Table 5 and 6.

The meristem culture can be maintained for an indefinite period of time in a disease-free condition. The original cultures are supplied by the Department.

Beginning this year, we are allowing three years for provinces to change over from the clonal selection system to this procedure. As of 1985, therefore, we no longer plan to eye index clonal selections in the greenhouse.

Any selections made then must first go through the disease-freeing and testing procedure and be transferred to the test tube as a meristem culture before it can be entered for certification.

I understand that the conversion is well underway in New Brunswick and Prince Edward Island.

Foundation Grower Seedplots are no longer needed or wanted. I know of only a few growers, and none of them in N.B., that continously recycle Foundation. The practice permits the constant carry-over of latent virus infections which is not acceptable in a virus-free program. We need a limited generation or flush out program if we are to keep infections at manageable levels.

Tuber sizes - (Refer to Table 7) The lawyers managed to make this a complicated amendment which sometimes I don't understand myself. This is a simplified presentation. All kinds of size combinations are possible, as there is no longer reference to sizes A, B or Contract. We ask you to stick to the four main sizes as otherwise there could be considerable delays in printing tags. Tags will be different this year. White for Foundation and blue for Certified. They will, besides seed size, indicate weight of the container in kg. For export overseas, you are informed that seed size must be specified in mm as per contract.

Export. I thought it would be interesting to show you the export performance of the 1980 crop. At the top is the U.S. taking 40%. Normally, this amounts to 20% of exports.

Table 9 explains to some degree why. The seed acreage is almost 1/3rd of that of PEI even though New Brunswick has as much, if not more, surface area planted to potatoes. In PEI, about 10% is not entered for seed certification. In New Brunswick, only 50% is entered for certification.

You will note the % passed, which in New Brunswick was 66.7%. The average national pass is about 85%. To me these figures look like trouble. By way of comparison, the Dutch pass rate runs at 97 to 98% on the average. I understand we had some newcomers last year who decided since they had to plant certified seed they might as well plant Foundation and then ask for inspection. A lot of their production did not make it. This is one of the reasons for the poor pass rate. I suggest seed potato production be left in the hands of those that are willing to put in the effort and are willing to learn the business.

Unlicensed Varieties

Two other regulation changes are ready to become law. One is the matter of fees for services charged to the grower which I will leave for my Minister and the other involves inspection and tagging of unlicensed varieties which present regulations do not allow.

What brought this about is the variety Caribe but it applies equally to new U.S. varieties which have not yet proven themselves in Canada, but are suddenly in great demand. On

March 10-11, the National Potato Breeding Advisory Committee meets to discuss under what conditions unlicensed varieties can be inspected and tagged. Generally, this will be for export only or for breeding lines almost ready to be licensed and undergoing trials in Canada and abroad.

True Seed

I just want to let you know that we are keeping an eye on that development which may turn out to be a flash in the pan. If necessary, regulations could be amended to adapt to what is potentially a major change in the production of seed potatoes.

Two more items remain that are likely to be incorporated in the regulations in the foreseeable future.

Summertesting

For the next three years, we plan to test for latent viruses X and S as part of the seed quality program. During those years, we will collect data to find out what the actual levels are and the kind of problems we are facing. After consultation, we expect to establish standards for all seed potato grades as part of the regulations and lots over the limit would not be certified. The Potato Association of America, already suggested certain standards for virus X some years back. They will be used for the time being and include virus S.

If you think these diseases should not be considered, I have some disturbing news; our major competitors have this program, and some importing countries test for X and S and have set maximum tolerances.

Post-harvest Testing

As you know, Agriculture Canada has assumed responsibility for phase 1 which is Florida testing. We got off to a fairly good start. However, this Fall all Elite and Foundation seed must be tested. There may be exceptions but the plan is to have seed from all the provinces, except Newfoundland, down at Homestead.

Phase II will start up this Fall when pilot testing in the new laboratories will take place. When the bugs are worked out, laboratory testing will be the sole means of verifying disease content and the Florida test will be dropped. In the intervening period laboratory testing will be checked out against Florida test results.

At the same time, as for summertesting, we will collect data on disease levels and after consultation will set a standard which will be incorporated in the regulations.

Some years back, I did a study on the effect of such a standard on the seed supply. It was most discouraging. In one province not more than 30% of Russet Burbank would have been certified.

There is no intention to wreak havoc with the seed supply situation. However, too many times have buyers been caught with bad seedlots. They need protection. It is no feather in our cap when these same seedlots end up in foreign markets with a high percentage of virus. Granted, not all the blame lies with the producer, but I have seen too many results of foreign trials, where Canadian seed potatoes showed substantially higher amount of disease in comparison with those of our competitors.

These test results could come as a shock to you. We have set temporary standards after the Collins Committee had time to reflect on them.

They are:	0%	Elite I
	0.15%	Elite II
	0.25%	Elite III
	1.5%	Foundation
	3%	Certified

They have been set after considering several factors primarily:

1. existing standards in U.S. State certification programs.
2. level of disease acceptable to foreign clients.
3. percentage of viruses tolerated in the next lower grade level.
4. maximum number of plants that can be rogued.

Assuming there are 20,000 plants in an acre, 1% over tolerance means the necessity to remove 200 diseased plants.

For an average field of 20 acres, 4,000 plants would have to be removed. I wonder how many growers do remove that many plants. And this is the crux of the whole matter. At higher percentages, it just is not possible for you to clean-up and pass inspection.

Florida test results are already available locally. We will have the computer printout in another week, I believe. Seedlots tested that are not over the tolerance are eligible for a green tag indicating it passed the Florida test. They will not be issued for export. However, where a country has set certain disease limits, the information will be used to determine whether a seedlot can be exported.

In three years time, you and I will know where we are. I hope that during those years, you will be able to make adjustments where necessary to improve the quality of your seed. It will be your achievement and you will reap the benefits.

All I can tell you at this stage is that Agriculture Canada will assist you where it can. It is you that alerted the Department to the problem. This is the Department's proposal.

THANK YOU.

Table 1

PROGRAM MANAGER
K. LEWIS

DIRECTOR
SEED POTATO DIV.
J.M. MULDERS

EXECUTIVE SECRETARY
J. BOUILLON

ASSOC. DIRECTOR
TECHNICAL SECTION
B. BORREL

ASSOC. DIRECTOR
INSPECTION AND
REGULATION SECTION
J. LAGANIERE

ASSOC. DIRECTOR
LIAISON SECTION

CHIEF
FIELD PROGRAMS
G. SIMPSON

PROVINCIAL REGIONS RESOURCES (P/Y)

NFLD	-2
MARITIMES	-67
QUEBEC	-10
ONTARIO	-3
MANITOBA	-3
SASK.	-1
ALBERTA	-1
B.C.	-3

Table 2

Amendment to the Seed Potato Regulations to provide for stricter control of Bacterial Ring Rot

Paragraphs 50(3)(a) and (a.1):
Inspection shall not be made of a growing crop if

"(a) the crop is growing on a farm where, in the previous year, potatoes infected with bacterial ring rot were produced or found, or until such time as the farm is no longer considered to be infected;

(a.1) the crop is growing in a field where

(i) in the previous year table stock potatoes were planted, or
(ii) there has been an occurrence of bacterial ring rot, until the field has been kept free from potatoes of any kind for two full years after the occurrence;"

Table 3

Working definition of "farm" for the purpose of seed potato certification:

> "All lands, equipment, vehicles, buildings and production stock, contained and managed as a separate unit."

Table 4

Principal Features of the Canadian
Seed Potato Certification Program

	OLD PROGRAM		NEW PROGRAM
1.	Disease free nuclear stock propagated through clonal selection and tuber-indexing.	1.	Disease free nuclear stock, derived from meristem cultures and propagated through stem cuttings in a protected environment.
2.	Recycling of Foundation seed permitted through Foundation Grower Seed Plots.	2.	"Flush-cut" or limited generation system through a maximum of 7 generations
3.	Certification based on visual field inspections.	3.	Certification based on field inspection plus mandatory virus testing
4.	Visual tuber inspection and special export testing.	4.	Madatory post-harvest test on
5.	Slight tolerance for PSTV in lower grades.	5.	No tolerance for PSTV in any grade.

Table 5

Amendment to the Seed Potato Regulations to officially recognize a Pre-Elite grade and to define how it shall be produced:

"SCHEDULE IV
GRADES OF SEED POTATOES

Pre-Elite

1. Pre-Elite seed potatoes shall be

(a) grown from

(i) cuttings planted in the field, or

(ii) tubers produced from cuttings in a greenhouse, screenhouse or growth chamber

that are derived from meristem cultures determined by laboratory or other methods of testing approved by the Minister to be free from disease; and

(b) inspected three times while growing and on each inspection determined by an inspector to be free from viruses and other diseases that may be discovered by visual inspection.

Table 6

Amendment to the Seed Potato Regulations to restrict the use of Foundation Grower's Seed Plots:

5. (1) Foundation seed potatoes shall be

(a) grown from Pre-Elite, Elite 1, Elite II or Elite III seed potatoes; and

(b) inspected two times while growing and the percentage of plants showing varietal mixture or visible symptoms of disease as specified in Column I of the Table to this section on the first and second inspection shall not exceed that set out in Column II or III of the table, whichever is appropriate.

(2) Notwithstanding subsection (1), Foundation seed potatoes may be grown from Foundation seed potatoes produced in the seed plot on the farm of the grower, if that seed plot was

(a) planted with any Elite grade seed potatoes in tuber units; and

(b) inspected three times while growing and each time met the requirements set out in Table 1 to section 4 for Elite III.

Table 7

TUBER SIZES

OLD	NEW
SIZE A	
long 113-454 g (4-16 oz)	long 50-75 mm
other 113-340 g (4-12 oz)	other 60-90 mm
SIZE B	
42-113 g ($1\frac{1}{2}$-4 oz)	long 40-50 mm other 40-60 mm
CONTRACT SIZE	
any size as specified in the contract	long - any size between 25 and 75 mm, expressed in multiples of five other - any size between 28 and 90 mm expressed in multiples of five except where the size is exactly 28 mm.

Table 8

Food Production and Inspection Branch — Seed Potato Division

Seed Potatoes Exports - 1980 Crop - in Tonnes

MARKET	P.E.I.	N.S.	N.B.	QUE.	ONT.	MAN.	ALTA.	B.C.	TOTAL
UNITED STATES	27,411.5	-	23,971.3	100.0	539.4	965.5	3,319.6	1,366.3	62,673.6
VENEZUELA	22,701.8	-	926.9	-	-	-	-	-	23,628.7
ARGENTINA	13,657.8	-	5,010.0	-	-	-	-	-	18,667.8
CUBA	-	-	14,323.5	-	-	-	-	-	14,323.5
URUGUAY	13,442.4	-	-	-	-	-	-	-	13,442.4
PORTUGAL	6,026.8	-	-	-	-	-	-	-	6,026.8
ALGERIA	5,896.8	-	-	-	-	-	-	-	5,896.8
SPAIN	3,877.4	-	1,389.4	-	-	-	-	-	5,266.8
GREECE	3,080.0	-	-	-	-	-	-	-	3,080.0
JAMAICA	1,199.6	-	-	-	-	-	-	-	1,199.6
PUERTO RICO	16.8	-	586.6	-	-	-	-	-	603.4
DOMINICAN REPUBLIC	595.0	-	-	-	-	-	-	-	595.0
BERMUDA	97.5	61.5	-	-	-	-	-	-	158.8
EGYPT	50.0	-	-		-	-	-	-	50.0
PANAMA	-	-	38.2	-	-	-	-	-	38.2
BRAZIL	-	-	27.5	-	-	-	-	-	27.5
HUNGARY	12.0	-	12.0	-	-	-	-	-	24.0
SABA	-	4.8	-	-	-	-	-	-	4.8
TOTAL	98,065.4	66.1	51,285.4	100.0	539.4	965.5	3,319.6	1,366.3	155,707.7

OTTAWA, AUGUST 13, 1981

Table 9

Food Production and Inspection Branch — Direction Generale, Production et Inspection des Aliments

SEED POTATO CERTIFICATION CERTIFICATION DES POMMES DE TERRE DE SEMENCE

SUMMARY OF FIELDS AND HECTARES ENTERED AND PASSED - 1981 CROP

SOMMAIRE DE CHAMPS ET HECTARES SOUMIS ET APPROUVES - RECOLTE DE 1981

PROVINCE / PROVINCE	NO. OF APPLICANTS / NO. DE DEMANDES	FIELDS ENTERED / CHAMPS SOUMIS	PASSED / APPROUVES	% PASSED / % APPROUVES	HECTARES ENTERED / HECTARES SOUMIS	PASSED / APPROUVES	% PASSED / % APPROUVES
NFLD/T.M.	6	37	37	100.0	8.25	8.25	100.0
PEI/IPE	729	4223	3980	94.0	21147.00	19893.00	94.00
NS/NE	20	117	110	94.0	70.00	58.25	83.2
NB/NB	447	2891	2597	87.1	11716.80	7811.60	66.7
QUE/PQ	91	768	601	78.2	1964.00	1312.00	66.8
ONT/ONT	42	313	243	77.6	859.61	683.43	79.5
MAN/MAN	9	94	94	100.0	1106.70	1106.70	100.0
SASK/SASK	9	56	51	91.1	123.33	103.03	83.5
ALTA/ALTA	19	271	264	97.4	619.78	593.79	95.8
BC/CB	52	310	254	81.9	433.50	331.00	76.4
CANADA	1424	9080	8231	90.6	38048.97	31904.05	83.8

OTTAWA, November 25, 1981

POTATO GROWERS SEMINAR - 1982

Dr. C. E. Smith, Executive Director
Potato Division

Good afternoon!

Express Thanks

- Organizing committee for inviting me to participate
- Other participants for allowing me to switch from Monday to this p.m.

Congratulate

- Industry for cooperating with the staff of the Potato Division (Barclay and Stokes) in making arrangements for this Seminar.
- Appropriate topic, "Growing Potatoes in the Changing Environment"
  - When you consider changes like interest rates, it is more than "change" - it is an "upheaval" and New Brunswick responded appropriately in January!

What changes have impacted on potato growers and the potato industry? A few Comments.

Introducton of Seed Quality Program

- Post harvest testing and the Florida Test program have been adopted by the Federal Government.
- Laboratory facilities for disease testing are being established in Fredericton and the staff has been hired.

Negotiations with the EEC

In June I was invited by the federal government to meet with the EEC Phytosantiary Committee in Brussels:

- A further two year derogation for shipment into Italy was obtained. This was possible because:
  - Agriculture Canada had conducted research that raised significant questions on the testing that had been carried out on Canadian Seed by EEC pathologists - for BRR.
  - We had established a flush-through system of producing seed.
  - New Brunswick was enforcing the Potato Disease Eradication Act and had established a program to eradicate Bacterial Ring rot, including the establishment of closed areas for the production of seed.

Stepped-up Phytosanitary Requirements

Phytosanitary standards (disease & insect tolerance levels) have been used for many years to control the entry of products that compete with the local supply. It is a very effective tool to use in regulating the import of a product. With potatoes, we are likely to see a lot more of this in the future. I feel that the key to expanded marketing of potatoes overseas rests with having:

a) an adequate Canadian research program in the pathology of potato diseases.
b) a strategy for the control of these diseases.
c) provincial enforcement of eradication and control legislation.
d) pathologists and virologists who manage research programs that back up the effectiveness of the disease control strategies through published research.

We need to place ourselves in a position where we can stand toe to toe and eye with our EEC competition and it must be in the area of plant disease control.

Results of Applied Studies

The results of applied studies of Potato Division staff working in cooperation with the industry has resulted in the following accomplishments:

- New insights in the use of agricultural limestone
- Introduction of sub-soiling as a practice on many farms
- Establishment of educational programs like the annual "Potato Growers Seminar"
- New insights in the management of potato pests, especially in the establishment of the source of 85% of Bacterial Ring rot and the establishment of improved monitoring systems for insect vectors.

New Programs for 1982

Storage Management Survey

Robert Hinds is presently conducting a Storage Management Survey. When completed it will establish:

a) What the storage capability is
b) Management practices presently being followed
c) What programs are required to establish improved storage capability and improved storage management.

Tissue Culture Facility and Greenhouse at Bon Accord

The Plant Propagation Planning Committee was formed to make recommendations on the most appropriate method of introducing the Seed Quality Program of the federal government. Its report recommended that a tissue culture facility be constructed in Fredericton and a greenhouse facility for tuber production be constructed at Bon Accord. These recommendations are currently being implemented.

Storage Management Specialist

A storage management specialist has been selected and will be beginning work shortly. The program will be developed over the next year and will include:

a) establishment of a storage facility at Wicklow
b) program to utilize the storage to demonstrate recommended storage management practices and to evaluate new concepts in storage management.

Conclusion

I would like to once again thank the industry for working so closely with our staff in making the last two days a successful event.